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The Journal of **Advanced Therapeutics**

*Official Organ of the
American Electro-Therapeutic Association
Official Organ of the
International Association of Climatologists*

PUBLISHED MONTHLY



VOL XXVI.

EDITED BY WILLIAM BENHAM SNOW, M. D.

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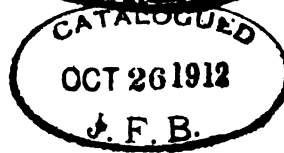
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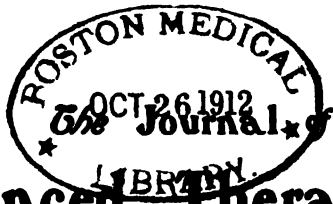
REVIEW OF FRENCH CURRENT LITERATURE.—Amédée Granger, M. D., New Orleans.

OPHTHALMOLOGY AND OTO-LARYNGOLOGY.—W. Scheppegrell, M. D., New Orleans.

1908

A. L. CHATTERTON & CO.





Advanced Therapeutics

Vol. XXVI.

JANUARY, 1908.

No. 1.

PHYSIOLOGICAL LAWS RELATING TO THE EFFECTS OF PHYSICAL MEASURES AS EMPLOYED IN THERAPEUTICS.*

BY WM. BENHAM SNOW, M. D., NEW YORK.

The reader of current medical literature can but be impressed with the fact that among the writers who employ physical measures in therapeutics there is a wide diversity of opinion as to the best method of meeting the varied indications. Often it may be true that there are more ways than one of accomplishing the same result, but in any event there is an underlying principle which governs the action of measures physiologically in their effects upon a certain pathological process, whereby one measure or combination of measures would be better than another. In other words, in relieving a pathological process or condition by physical measures, some one, or combination of the various methods, from the nature of things, best conserves the purpose.

The diversity of opinion now existing in the methods employed is misleading to the student who sets out to investigate physical therapeutics, and leads to a degree of uncertainty of action which is derogatory to the accurate acquisition of the knowledge of how and what to do with these measures.

The reason for the differences of opinion and method on the part of the present-day operators may undoubtedly be explained from the fact of self-education in the employment of one or more methods without considering others, and without exercising a definite recognition of a point of view as to the physiological effects of the other modalities as well as of those employed. In other words, to the present time a larger part of the work in physical therapeutics has been done along empirical lines, the empirical lines of clinical experience, with reference to their rational indications.

* Read on September 18, 1907, before the American Electro-Therapeutic Association at Boston, Mass.

It will be readily seen that the most important study in order that the employment of these measures may be most effective, is the discovery of correct points of view—*laws*—based upon the scientific recognition of physiological and physical effects as well as from the clinical results wrought upon abnormal conditions.

While it will often be very difficult to determine the exact *modus operandi* of the various modalities upon the cell, or the neuro-muscular mechanism, or circulatory apparatus, it can be largely determined, and clinical experience demonstrates what is of equal importance—the practical result, which when uniformly repeated establishes the law. The effects upon metabolism cannot be observed except that the functions of an impaired organ or part are restored, which is significant. It is important to know that a modality when employed to restore functions, is likely to accomplish the end in view without detriment in some way to some other organ or function—a two-edged sword—as experience has taught us to consider many of the most used pharmaceutical remedies. It will be readily seen that this might occur from the injudicious use of such agents as the x-ray, the large amperage employed with the continuous current, as well as an indiscreet use of most if not all of the physical measures.

It therefore becomes apparent that the advanced physician who would employ these measures in therapeutics must do so with a knowledge of their physiological action, therapeutic indication, and a keen insight into the methods of application of every one of the measures included in the category of physical therapeutics.

With these premises in mind, it is apparent that every one of the collaborators who have been pathfinders, as it were, and who have each in some instance developed better qualifications in the use and understanding of the action and application of one or more of the modalities, has done so more or less to the exclusion or proper recognition of others. It therefore behooves each one to consider the broader scope in the interest of honest investigation and inquire if he is not in the rut employing too narrow lines in the choice of methods to the detriment of his patients' best interests.

The statement may be boldly made that at this time every investigator is more or less narrow in his prejudices and con-

ceptions of the value of some of the physical methods. The object of this paper is to call attention to these facts and to urge upon the members of the Association the importance of an organized effort, looking to the development and establishment of a course of investigation and comparison of methods which will determine in the future definitely studied lines of action, which will make the paths easier for the hosts who must soon adopt the use of these measures for humanity's sake.

If the laboratories of our great hospitals and our colleges were open to research work in this field and were making careful comparative studies of physiological effects and clinical results, the problem of investigation and study might be in a large measure provided for; but as it is, these institutions are not giving their attention to these studies but pursuing industrious research, particularly in the field of bacteriology and serum-therapy; and to their credit be it said, we are indebted to them for many discoveries which have added greatly to the possibility of diagnosis and success in a still small but growing field of therapeutics, adapted to prophylaxis and the treatment of infectious diseases.

When the value of physical therapeutics is more positively demonstrated, as it will be by the dissemination of a more definite and precise notion of its scientific importance, these institutions will likewise aid in the investigations. Until then, the burden of responsibility must fall upon the comparatively small number of the members of the profession who are comprised in those who have already become impressed with the vast field which is in time to be occupied by physical therapeutics.

It devolves largely, then, upon the members of our organized associations and congresses devoted to these subjects to carry out these researches. While this could be accomplished in a very large measure by the establishment of a great research institution, provided with laboratories and clinical facilities for making comparative studies—clinical and physiological, in lieu of the endowments necessary to meet this most desirable opportunity for investigation, it is important that some other organized effort be made to further the research and elucidation of these important questions.

In the past history of this Association it has too often

been customary for those who have been in the habit of using the older methods of procedure to criticise departures in a new direction. Every year subjects are presented from various points of view and reports of cases in which the evidence of broad conception and forethought, shows the importance of studying and demonstrating new methods instead of obstructing progress by what objectors choose to call conservatism.

The work of this Association and the aim of the workers should be to unify ideas and bring out the sound scientific demonstrations of principles embraced in the wide scope of all the departments of therapeutics to which it is devoted.

A department of investigation and research should be assigned to a committee of energetic members who will endeavor to clear up the doubtful points in physiological action, indication and therapeutic application, of each and every one of the agents employed, and report the progress in research before each annual meeting of the Association. Earnest investigation followed by earnest discussions in assembly of these questions will further the final standardizing of methods upon a scientific basis.

That definite laws may be elucidated and distinctly classified which will govern the employment of physical agents in therapeutics, in accord with the energetic physical properties, is certainly possible. Such laws will pertain to effects of penetration, induction of vibration or motion of various qualities; actions inhibitory or stimulating; actions affecting the activity and function of the organic cell, restoring metabolism, removing stasis, preserving or re-establishing activity of function. Such laws must govern in various ways, by direct indication, the employment of various modalities, inducing effects by direct or reflex action, and by their influence restore or improve nutritional processes or remove infection, local congestion, or stasis.

One electrical modality may stimulate one process and inhibit another; one may destroy germ life by direct influence upon the microbes or parasites; another may accomplish the same result by raising the resistance or the opsonic index against inherent destructive functions of the organism. One modality may relieve pathological stasis more effectively than another. One may stimulate secretions in a more effective way under certain conditions than another, and another exert

more favorable influences upon the cell, the neuro-muscular mechanism, or the circulatory and metabolic processes.

For example: light influences to increase metabolism; it is also capable of destroying germ life or it may stimulate some forms of germ life. The same is true of the x-ray. Electricity induces vibration in one way, mechanical methods and massage in another way; agents which induce hyperemia may effect it in various degrees both as to intensity and persistence, altering the nutrition, increasing phagocytosis, and removing active abnormal processes. It is safe to say that in any congested viscus or organ, except possibly the brain, we are able to affect the tissues in a favorable manner prior to the institution of an organic destructive process, re-establishing nutrition and normal metabolism either in infectious or non-infectious conditions.

Chronicity with degeneration and structural change, which must be taken into consideration in determining the prognosis in every case, is the *bête-noir* of therapeutics.

The laws which govern the action of the great number of modalities, electrical, thermic, mechanical, nutritional, and actinic, are capable of a scientific and definite determination along rational lines. The consideration of these questions from an empirical point of view is no longer deserving of the attention of scientific minds, for *positive physical agents give uniformly positive therapeutic results when similarly applied in like cases, indicating the possibility of establishing definite laws of action and indication.*

Disease arises from, or is associated in almost all cases, with an inflammatory process, infected or non-infected. *Inflammatory processes* present characteristic conditions varying slightly according to the character of the cause.

I. *Traumatic non-infected inflammation* arises from trauma or any other cause which induces an influx of blood to a part, through the afferent channels, more rapidly than it can be discharged by the efferent channels, resulting in a condition of engorgement—local stasis. This condition if established with intensity is not capable of removal by any natural process for a long time—often for years—thereby creating a chronic condition of swelling or induration and degrees of pain varying with the location and extent of the lesion. Involving the nerve, as in the characteristic neuritis, the pain may be severe either

at the site of the lesion, or at the terminals of distribution of the involved axis cylinders, or both, or when located in the structure of a joint or some other part of the motor apparatus, there will be pain on movement.

A condition of *stasis* may also occur following mild degrees of congestion in the various glandular organs of the body as of the liver, spleen, pancreas, or lymphatic glands, resulting in conditions of congestion with a disposition to persist unless radical measures of a mechanical sort are employed to remove them.

II. *Infectious inflammatory processes*, the other type of inflammatory congestion, have the same characteristic condition of swelling and induration, but with a tendency to increase, owing to the presence of some specific contagion or infection as staphylococci, streptococci, tubercle bacilli, or various other of the germs which from successive reproduction in the tissues maintain a chronic process and precipitate toxins or otherwise poison the system during the life of the colonies. A different method of treatment is indicated in these cases, demanding first the destruction of the element of infection and later the removal of inflammatory stasis as in other cases.

III. *Functional torpor* presents conditions of relaxation and softening of tissue, with weakening of the muscular force and general loss of circulatory and nervous tone arising usually from the atony of inactivity or paralysis of the part affected. Overstimulation and excesses are productive of conditions of torpor from exhaustion, and they may also follow poisoning or courses of exhausting disease, as after fevers or in conditions such as diabetes or chronic Bright's disease.

IV. *Degenerating conditions* of the different structures call for altered activities to stop the process. (1) With advancing years, degeneration of the great glands arises from various causes, as of the liver in cirrhosis, the kidneys in Bright's disease, the pancreas in diabetes. (2) Degeneration of the muscular system occurs with fatty degeneration of the muscles, particularly important as affecting the heart and muscular dystrophies. (4) The degenerative process of tabes is undoubtedly associated with a low-grade inflammatory action, with destruction of the central neurons of the cord, and sub-coats of the arterial walls in arterial sclerosis. (3) Degeneration of the nervous system, as of tabes, syringo-myelia, and the

stitution of sclerotic tissue. The treatment should therefore be directed to the removal of this process as much in tabes as in the treatment of simple arthritis, and from this point of view in the early stages it is amenable to treatment.

V. *Conditions secondary to other processes usually of inflammatory origin with impaired secretion and other inactive functions:* The reflex or functional neurosis in male and female characterized by the *symptoms complex* known as hysteria, neurasthenia, hypochondriasis and melancholia, almost invariably have their origin from some inflammatory process, generally in the pelvis, as from prostatitis and seminal vesiculitis in the male, and dysmenorrhea associated with uterine congestion or subinvolution, or other pelvic congestions with or without misplacements, in the female. The relief of these conditions by appropriate treatment, affords most remarkable evidence of the place occupied by these inflammatory processes as a causative factor of the symptoms complex of the functional neuroses.

VI. *Contractures* or conditions of *muscular spasm* are associated usually with an impairment of the nerve centers, of the nerve trunk, or with an inflammatory process in the joints involving the skeletal as well as other muscles of the body. The indications in all cases demand first the relief of the process of congestion or other irritation and coincidentally treatment of the spasmodic condition present.

The glands, the neurons, the organic structural cells with the neuro-muscular mechanism, central nervous system and connecting links in a normal state of functional activity is the *sine qua non* of health. With this premise it is self-evident that the vibratory impulses which restore functional vibratory rhythm and activity by exciting action in the parts impaired by pressure, congestion, or lowered nutrition must induce restitution relative to their effects upon the parts involved. The fact that all physical agents will induce degrees of vibratory action of varying qualities, capable of setting up functional vibratory activity, suggests at once the importance of their consideration in therapeutics.

As previously observed no conditions play so general a part in disease as the *inflammatory processes, infectious or non-infectious*. The great importance, then, of the establishment

and recognition of laws governing the control or removal of these conditions is apparent.

Every inflammatory process, acute or chronic, is characterized by the presence of varying degrees of local induration—*stasis*—the result of the failure, under existing conditions, of its removal by normal physiological processes. If the fact were generally recognized that local *stasis* is a pathological condition which prevents reparative action on account of the general stagnation present with the cutting off of circulation and elimination, and that the first indication in non-infectious cases is its removal, it would be recognized to be the first law of treatment.

In infectious cases, two indications are to be met. (1) The removal of some germ process by sterilization or direct destruction of the germs and (2) the subsequent resolution of the resulting induration.

The modalities which are to act upon an indurated area must be selected according to the conditions present. If the active process has entirely subsided and the tenderness has disappeared the tissue that remains will usually be an organized scar or hyperplastic tissue, when the x-ray or negative pole of the continuous current will be indicated.

During the stage of infiltration and active congestion in *non-infected cases*, the static modalities, the agents which will cause the most diffuse and extensive tissue contraction and may be administered with a regulated rate of interruption, which will permit tissue responses, and when continued for a sufficient time, and at proper regulation as to frequency of treatment, will best deplete the induration and re-establish circulation and elimination, and at the same time induce metabolism; it is accordingly the indicated procedure.

In *infectious cases*, as suggested, the indication is for the employment locally, first of some agent which either by sterilization or other destructive action will eliminate the germs present, followed subsequently by the same procedures employed in the treatment of non-infected conditions.

The laws of therapeutic indication suggested by the preceding consideration must be based upon the character of the action of the physical measures, as well as the pathological conditions and indication for their relief.

We exclude from present consideration two of the most im-

portant and too often neglected measures, diet and exercise, the laws for the use of which are, or should be, generally understood and systematically employed.

The various electrical modalities, light, the Roentgen ray, mechanical vibration and heat—hydrotherapy, pertaining to the employment of different temperatures—each is possessed of its own unique field of action and adaptation.

I. *Static electricity*, according to the method of administration or modality employed is characterized by three distinct qualities of action: (1) the mechanical, (2) the actinic from effluve and vacuum tube administrations, and (3) polarization, electrolysis being insignificant. From the respective effects the following laws may be evolved:

(1) The modalities of the static current produce to a greater extent than any other diffuse, penetrating tissue and protoplasmic contraction with a minimum of irritation, when the wave current, static induced current, the vacuum tube current administered directly from the static machine or the static spark are properly administered. They are therefore the measures *par excellence* in therapeutics for the dispersion of *pathological stasis*.

(2) For the same reason as stated in the preceding observation, the same static modalities which mechanically induce tissue contraction, excite vibratory activities in torpid areas, stimulating to a great degree local metabolism, with re-establishment of circulation and tissue repair where stasis and impaired or obstructed elimination are present.

(3) Another mechanical effect associated with the administration of the static modalities, administered with the patient insulated, is occasioned by the surging of the current from the point or surface of application or discharge. The effect of the passage of the substantial electrons is to induce degrees of general metabolism which is evidenced by the marked increase of secretion and general awakening of functional activities.

(4) Polarization associated with the passage to and from through the patient of one polarity with a unidirectional current, induces effects in the tissues which coincidentally awaken in another way activity.

(5) *The actinic effects*, in common with the high potential coil and static modalities associated with the radiations evolved

within the vacuum tubes and the convective discharges (the effluve, the brush discharge, and spray), are capable in varying degrees, according to the volume of current evolved, of destroying germ life superficially located, and in some instances to considerable depth within the tissues.

(6) *The phoretic action* of the current administered with the vacuum tube is capable of forcing into the tissues minute particles of nitrous acid evolved by the discharges and other medicinal substances, rendering them valuable in the treatment of superficial infected conditions.

(7) *Muscular spasms* of peripheral origin are locally relieved by the static modalities, either by the removal of sources of irritation or direct action upon the neuro-muscular mechanism.

A broad conception of the indications for the employment of the static modalities would indicate their use in all non-infected, inflammatory conditions, internal and external, and for the energetic re-establishment of local and general metabolism. The following special indications are conserved by them:

(8) The static spark and static wave current, and to a less degree the brush discharge and the direct vacuum tube current, are the means *par excellence* for the treatment of all *non-infectious joint inflammations*.

(9) In the treatment of uncomplicated *neuritis* in regions accessible (the only exceptions being within the pelvis, chest wall, and bones of the skull) the static wave current, static spark, brush discharge, and direct vacuum tube current, alone or in combination, are uniformly effective in skilled hands and the choice of methods in those cases.

(10) In the treatment of *spinal cord affections* of a non-infectious inflammatory character including *tubes*, *anterior poliomyelitis*, *myelitis*, *syringo-myelia*, and the *dystrophies*, the static wave current to the spine and sparks to the periphery, in adults meet the conditions present, to effect which they must be applied with great energy over the site of the lesion of the cord and without fear.

(11) In the treatment of *pelvic* and *genital* conditions non-septic in character, the static wave current, and direct vacuum tube current, are effective in the following conditions; *uterine congestions* and *dysmenorrhea*, *subinvolution*, *cervical ulcera-*

tion, salpingitis, ovaritis (usually secondary), urethral caruncles, vaginismus, hemorrhoids (not indurated), fissure in ano, rectal ulcers, prostatitis (not removing hyperplasia), vesiculitis (specific and non-specific), congestions in the spermatic cord and canal between the internal and external rings, epididymitis, orchitis, chronic gleet, and impotency in many cases. In all of these cases named those modalities are most effective, safe, and cordially to be recommended.

(12) In the following *glandular congestions* either the wave current or direct vacuum tube current are the choice of modalities. In enlarged and congested liver, spleen, simple adenitis, in simple mastitis, and tonsillitis before suppuration has advanced, over the pancreas in diabetes, the kidneys in Bright's disease, the adrenals in Addison's, and the thyroids early in simple goitre and Graves' disease; over the stomach, duodenum and ileum when secretions are abnormal or deficient; over a dilated stomach and constipated bowels. In the above conditions the static modalities are very effective, more so than other agents in most cases, because by inducing active energetic intrinsic contraction they remove congestion and infiltration and restore tone and metabolism.

(13) Conditions of *spasm* or *muscular contraction* are relieved by the static modalities, particularly by the sparks and wave current. Either through the secondary effect of relieving congestion, as when associated with joint diseases, in dysmenorrhea or vaginismus or by the direct antispasmodic influence in other conditions, as in high arterial tension and acute spasm, as in muscular cramp.

(14) On *general* and *local metabolism*, when not complicated by organic disease, the static modalities, particularly the wave current, are remarkably efficacious and indicated as part of the régime in all cases; because all of the functions are demonstrated to be quickened; weight increased, hemoglobin percentage is increased, an approach to normal in the blood count induced; all due, undoubtedly, to a quickening of cell activity throughout the economy, owing to the stimulating influence of the passage everywhere of the rapidly moving electrons.

II. *High frequency currents* of high potential and alternating in character are derived from both coils and static machines.

When static machines are used as a source of these currents, at least 16 revolving plates approximately 30 inches in diameter are necessary to render the currents efficient for administration of auto-condensation; and coils capable of throwing at least an eight-inch spark between the terminals. In addition to the coil or static machine, inducto-resonators with condensers combining provision for so-called Tesla, d'Arsonval, and Oudin currents, in conjunction with a properly constructed auto-condensation couch and electrodes, constitute the usual apparatus.

The modalities of importance employed with high frequency currents are auto-conduction, auto-condensation, the effluve, the resonator spark, and the currents applied with the vacuum electrodes.

Of *auto-condensation* and *auto-conduction*, clinical evidence is abundant that they do affect metabolism, favorably promoting secretion and elimination, depleting in cases of obesity and promoting tissue building and increased development in growing animals. That *d'Arsonvalization* lowers arterial tension, favorably affecting conditions present with or leading to arterio-sclerosis, including high tension and nephritis, is clinically demonstrated.

That the *modus operandi* of auto-conduction and auto-condensation is due to the mechanical influences of the substantial electrons upon metabolism and an unexplained effect of electricity upon tissue change, organic function, and other action or combination of actions, is too uncertain to establish other than suggestions of clinical laws of therapeutic indication. The other modalities have distinctly active effects which may be explained from their *stimulating*, *actinic*, *antiseptic*, and *rubefacient effects*. The following laws of indication may be evolved:

(1) Clinical experience has demonstrated the efficiency of d'Arsonvalization in lowering arterial tension, thereby relieving conditions associated with or leading to arterial-sclerosis.

(2) In obesity, auto-condensation promotes tissue combustion with the reduction of fat, adding to the efficiency of diet and exercise in these cases. The combination is particularly efficient in reducing body weight, without unfavorably affecting the general health.

(3) *Auto-conduction*, as administered in the presence of

solenoids or between fields of opposite electro-static charge, induces increased activity of general metabolism and tissue building.

(4) *The stimulating actinic and antiseptic action* of the high frequency currents from the effleuve or vacuum tube modalities, while simulating the action of the static convective discharges and static vacuum tube applications as described with the laws of indication for the static modalities, possess a greater volume of effect in this regard, on account of the larger amperage of the currents employed, and are capable of destroying many species of germs in the periphery, and also of diffusion through the mucous membrane and skin, particularly affecting streptococci, staphylococci, gonococci, and tubercle bacilli, when superficially located beneath the surface, and is most efficient when administered with the d'Arsonval current employing the opposite electrodes on either side of the involved tissues. These effects arise undoubtedly from the combined actinic and antiseptic effects upon the germs, together with the coincident increase in the number of the phagocytes present in the tissues thus rendered hyperemic.

(5) The resonator spark when applied successively to a small area is capable of inducing local tissue destruction followed by slough and may be employed in the treatment of condylomata, angioma, lupus vulgaris, and epithelioma, as first demonstrated by Rivière.

(6) The rubefacient effect, stimulating in character, induces superficial hyperemia, and when systematically employed improves local nutrition, restoring conditions following the inhibitory influences of the x-ray, alopecia, and other trophic skin conditions as well as inducing local phagocytosis and elimination, to an extent, of germ life.

III. *The continuous current*, administered with or without interruptions, is the current *par excellence* for (1) electrolytic, (2) phoretic, (3) divulsant, and (4) cauterant effects. To this may be added the mechanical action of the continuous current, interrupted, in which it is, however, inferior in effect to the similar action of the static currents. The effects of this current upon general or local metabolism do not compare favorably with the similar action of the more energetic, more highly diffused static and high frequency currents.

(1) *The destructive electrolytic action* of malignant and

other infectious processes by the employment of currents of large amperage, employing by Massey's method *zinc-mercuric electrolysis*, is effective and practical in such conditions, particularly in processes involving tubercular glands, the face, mouth, rectum, and in selected cases involving the female breast.

(2) The employment of oxidizable electrodes of copper, silver, zinc, or zinc-mercury amalgam is an effective means of relief in the treatment of endometritis, uterine hyperplasia, hemorrhoids, pyosalpinx, fibroids, fistulæ, gonorrheal vaginitis, and similar cases.

(3) *The hydro-electric method of Cleaves* with water as the active electrode, or in conjunction with the salts of silver, copper, zinc, or mercury in solution by the vaginal route, employing sufficient fluid and pressure to exert distension and employing 1 to 50 milliamperes of current, is valuable in the treatment and removal of pelvic exudates, chronic para- and peri-metritis, endometritis, fibroids, ovaritis, and local infectious conditions.

(4) *The phoretic action* of the continuous current for induction into the tissues of medicinal substances when desirable, the electro-positive being driven from the positive pole and the electro-negative from the negative.

(5) *The divulsant action* of negative electrolysis upon scar tissue renders it efficient in resolving keloids (for which the x-ray is superior) and is particularly efficacious by the Newman method in removing strictures of the mucous membrane of the urethra, rectum, and esophagus. Strict attention to technique and current strength in these cases is imperative.

(6) *The cauterant effect*, induced by passing large ampere currents through metallic substances of high resistance, is effective whenever cauterant effects are indicated.

(7) *The mechanical action* of the continuous current, interrupted, may be utilized in connection with other continuous current administrations, but does not compare in efficiency in the treatment of inflammatory processes with the static modalities.

The actions of the induced and sinusoidal currents, while efficient in producing peripheral stimulation, do not compare in their effects with the currents of higher potential, but are capable in skilled hands of effecting similar therapeutic results

in localized areas, and the portable apparatus is also valuable in indicated conditions calling for stimulation of muscular action by application to motor centers at the bedside.

IV. *The Roentgen ray* induces two distinct physiological effects: *stimulation* and *inhibition*. The stimulating effects are of little or no significance in therapeutics, as other agents possess these qualities to a greater degree and induce them with greater certainty.

To the inhibitory effects of the x-ray, by which the cell is affected by the induction of degrees of inertia varying with the character or nutritional activity of the cell, the length of exposure, and the quality of the ray employed, is due its therapeutic value. To this inhibitory effect may be attributed sterilization of the life-giving function of the germinal spot, in seed or living creature, diminution of functional activity of the organic cell, and organ or part exposed to the extent of inducing inhibition, divulsant effects and resolution of adventitious and lowly vitalized tissue, and the extreme effects of tissue necrosis from extreme exposures, and paralysis of nervous structures resulting in dermatitis associated with tissue necrosis. These actions form the indication for the general therapeutic employment of the Roentgen ray.

(1) The sterilizing influence of the x-ray indicates its judicious employment in the treatment of infectious conditions, for effects on germs, having already proved efficacious in all fungoid affections of the skin as well as in the tubercular, streptococcic and staphylococcic affections, superficial and deep-seated.

(2) *In conditions of hyperactivity* of the glandular system and hypertrophic processes, the x-ray is generally capable of inhibiting such activity, and under prudent administration in a large class of conditions under this classification is a valuable therapeutic measure.

(3) The x-ray resolves or destroys by inhibition the tissues of low vitality, thereby promoting the resolution of scar or adventitious tissue in keloid and plastic adhesions, as well as destroying the low vitalized tissue of malignant processes. In many instances normal tissue replaces neoplastic tissue during irradiation; not from stimulation but because of release to a degree, from destruction of the tissue of less vitality as in epithelioma. From this resolvent action it should be ac-

corded a recognized place in therapeutics, including exposures before and after operative procedures in the treatment of every malignant process.

(4) In the two types of lupus, vulgaris and erythematosus, the replacement of the diseased tissue by normal during the process of raying is rare, requiring subsequent employment of stimulating measures, as the static brush discharge, light, or the high frequency currents, which induce stimulating effects opposite to the inhibitory action of the Roentgen ray.

(5) *The hemostatic action of the Roentgen rays* is due to the influence of induced tissue contraction and is promptly effective, and indicated for the relief of the hemorrhage associated with uterine fibroids mena- and metra-rhagia, and hemorrhage associated with tuberculosis and ulcer of the stomach.

(6) In *inflammatory processes* associated with conditions of pressure and pain *due to exudations*, the x-ray is effective as an adjunct method in subacute cases and the means *par excellence* where organized exudates are causing pressure and pain, as in chronic *tic doloroux*.

V. *Radiant light and heat* in combination and distinct from each other comprise the action of agencies which are closely allied to each other, and which in combination are best suited to meet numerous therapeutic indications.

The method of Neils Finsen in which the rays of highest frequency, the ultra-violet, were employed with the heat rays filtered out and the exposure made under pressure to render them anemic, and applied for the destruction of lupus processes in the skin, has been generally supplanted by the more energetic action of the Roentgen ray and radium followed by the stimulating influence of all the heat and light frequencies or the effluve or brush discharge of the high potential currents.

Dry heat, by convection, used distinct from light, fills a place which while not positively demonstrated to be of distinct advantage over radiant light and heat in the cases to which it is adapted, has, however, from its use in septic infection in which it meets the indications established its value, as deserving of distinct consideration.

The effects of radiant light and heat are both distinctly stimulating, light possessing also actinic and antiseptic quali-

ties, while both induce intense hyperemia, and thereby the local presence of increased numbers of phagocytes. The ultra-violet rays are highly superficial in their action and remarkably irritating as marked in the burning influence upon the outer layers of the skin.

In the combined action of light and heat the effects are to materially increase general metabolism. Heat also produces superficial tissue contraction, when the administration is prolonged, through stimulation to contraction of the tissues as of the washerwoman's arms and fingers. Under these premises the following therapeutic indications are conserved:

(1) The *actinic and antiseptic effects* of combined light and heat radiations, induce an increased local vascularity with a relative increase in the number of phagocytes in the tissues, which together with the inhibitory action of the heat and light upon the germs present in the infected area, facilitate the destruction of the germs present, by the phagocytes and promote coincidently a re-establishment of active metabolism, while the active diaphoresis eliminates the toxins. The same effect is derived from the prolonged convective administration of dry hot air, which is remarkably efficacious in the relief of general and localized septic infection.

(2) The *hyperaemic or rubefacient action* particularly of the ultra-violet rays, as administered from the electric arc or from the concentrated rays of the sun, filtered through cold water with rock crystal lenses or in combination with white light the heat projected by the electric arc and direct sun's rays, is energetic in producing persistent hyperemia which does not disappear for days and which, when graduated, renders them valuable for the improvement of the nutrition in the skin; as in the treatment of the types of alopecia and other cases of impaired functional nutrition of the skin.

(3) The ultra-violet rays may be administered to tissues for destroying tubercular infection, as in lupus vulgaris and lupus erythematosus, but are giving place to more speedy and equally effective measures.

(4) *Radiant light and heat* in combination and administered with the exclusion of the ultra-violet which is filtered out by passage through glass, combine the effects of the more penetrating rays of lower frequency with the radiating thermic rays which penetrate deeper than heat by convection, increase

tissue oxidation and secretion, and reflexly improve general metabolism, without the dermatitis and tanning effects of the ultra-violet rays.

(5) *Radiant light and heat* by stimulating greater activity in the functions of the skin relieve overtaxed kidneys, and in nephritis are a valuable means of relieving the conditions, lessening or stopping the degeneration and albuminuria and often promote recovery or abate the destructive process.

(6) *Radiant light and heat or dry heat* by reflexly acting upon the spinal centers, stimulate elimination and metabolism in impaired conditions, relieving toxemia and defective metabolism as in gout, rheumatism, arterio-sclerosis, auto-intoxication, and septicemia.

VI. *Hydrotherapy* must be considered essentially as a means of applying different temperatures convectively to the body; but as radiant light and conductive dry heat can be applied at so much higher temperatures, owing largely to the cooling influences of the latent heat of evaporation, they possess consequently greater efficiency for heat effects. Dry administrations of heat are therefore to be preferred except for application of temperatures below that of the body, and when administered for reflex stimulating effects, as when heat and cold are alternated with douches and sprays.

(1) *Alternate applications of heat and cold* when properly administered increase the reflex responses of each, improving metabolism and vital functions.

(2) *Cold produces contraction* of the superficial vessels with pallor and chills, and coincidently induces muscular contraction, for which effect it is indicated in superficial hemorrhage and for the temporary suppression of superficial, inflammatory processes.

(3) *Cold applications*, of temperatures below that of the body, applied for a considerable time convectively cool the blood and lower temperatures and are indicated in febrile states.

(4) *Application of cold* stimulates an increase in the number and depth of respirations and is indicated in restoring respiration or inducing it in the newborn and in increasing generally oxidation and metabolism through its reflex influences upon the circulatory system.

(5) *Short applications of cold* in normal individuals stimu-

late, by prompt reaction, superficial hyperemia and more active circulation in the skin, and coincidently act reflexly to increase oxidation and elimination in internal organs indicating its value as a habitual routine practice during health. It is also instrumental in restoring active function, as by the employment of the cold pack in diseased conditions.

(6) The systematic employment of heat and cold coincidently to different parts of the body, relieves congested conditions as by the application of heat to the pelvis and lower extremities, and cold applied over an engorged viscus, as over the liver for the purpose of depletion.

Mechanical vibration by skilled application influences metabolism and nutrition by its mechanical, thermal, and reflex influences. (1) Mechanically it induces the removal of extravasations, exudations, and transudations, breaking up adhesions and stimulating the circulatory and lymphatic systems. (2) Chemically it assists in the interchange of oxygen and CO₂, and may increase heat production or elimination. (3) Reflexly it improves respiration, stimulates secretion and excretion, and contracts tissues;—effects are essentially either stimulating or inhibitory, depending upon the manner of administration.

From the above principles the following laws of indication may be evolved:

(1) Interrupted mechanical vibration of long duration or of shorter duration with greater pressure over the spinal centers and sympathetic ganglia and through the ramus communicantes inhibits local and peripheral function and metabolism. It has a sedative effect.

(2) Application of interrupted vibrations of short durations reflexly stimulate functions and metabolism, deep and peripheral, thus acting as a tonic.

(3) Conditions of contracture associated with acute or chronic processes are best relieved by applications of mechanical vibration over the motor-points and the body of the muscles supplying the contracted muscle by employing applications of prolonged inhibitory impulse.

(4) Edema is treated by the application of interrupted vibration over the joints and friction centripetally from joint to joint, commencing at the upper portion of the edematous area. Applied in this manner it is instrumental in dispersing acute or subacute edematous conditions.

(5) Interrupted vibration about the joints and structures following contusions or fractures and vibratory friction above and below the joint are invaluable in relieving the edema, relaxing the muscles, increasing mobility, and stimulating nutrition in the structures of the joints.

(6) The treatment of constipation by medical vibration scientifically employed over the spine, abdomen, and per rectum is the measure *par excellence*, in connection with a judicious diet.

(7) For physical examination and diagnosis mechanical vibration applied over the spinal interspaces, ganglia, and glandular structures, is an invaluable means of investigation.

In this résumé of the indications and actions of physical measures in therapeutics which I offer as suggestions, earnestly requesting criticism and reconstruction, I have endeavored to point out what seems to be in justice due to the members of our profession, who are looking to us for light and instruction, and urge upon the Association the adoption of the measures which they approve and the rejection of those which are not sustained.

If the Association will adopt such method of investigation and find out the correct course to be followed in the employment of physical therapeutics along the lines suggested, it will bestow upon the profession and humanity one of the greatest possible benefits.

349 W. 57th St.

(To be concluded.)



VIBRATION.*

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In selecting Vibration as a subject to bring before this Society, I do so fully realizing its breadth and importance, as well as the impossibility of dealing with it other than in the most general way in a paper of this brief character. That it is the greatest physical force in the universe known to Man is a fact so generally accepted that argument or proof at this time seems unnecessary. So great and far-reaching is it in its mighty potentiality that were it to cease, even for one brief moment, the universe would be rent asunder, and all life therein destroyed.

Everything, everywhere, is in a state of vibration, ranging from the earthquake's shock and the thunder's roar to the finest undulatory waves in the universal ether, and the most subtle impulses emanating from the thought centres of Man's conscious mind.

All of nature's phenomena with which we are familiar are vibratory in character, and if we go further than the known into the realms of the speculative, it is easy to imagine that the regions unexplored are unknown to us because we are unable, as yet, to harmonize our vibrations with those of higher planes. Truly, the imagination has a fertile field in which to work when it contemplates "the long, dark, soundless space between 40,000 vibrations per second, where the human ear ceases to hear, and 400,000,000,000,000 of vibrations per second, where heat and light begin, as well as in the infinity of range beyond 700,000,000,000,000 of vibrations per second, where light ceases." The gradient in these unknown undulations is a long one, "representing a gap wide enough to include another world of activity; and there is no good reason whatever for supposing that matter is incapable of such intermediate activity, or that such activity may not give rise to intermediate sensations, providing there are organs for taking up and sensifying their movements."

* Read before the New England Electro-Therapeutic Association, Boston, Mass., October 11, 1907.

Light, heat, cold, sound, touch, taste, thought, hope, anger, fear, sorrow, happiness, joy, and, in fact, everything physical, spiritual, and emotional are but the manifestations of different rates of vibration. The eye sees, the ear hears, and the tongue tastes, not because of any recognized histological difference in the nerves governing these organs, but because of special structures in each of them tuned to respond to the vibratory impulses capable of producing their different sensations.

That there is a wide range in the appreciation and interpretation of nature's phenomena in different individuals and in different races is a well-known fact. In the lower races of to-day, as was probably true of primitive man, the range of vision and the power of hearing and of smelling is more highly developed than in those of the higher races, while the color sense is much less acute. This probably holds true of the whole lower animal kingdom. The reason for this is obvious; never having been familiar with the finer shades of color, that portion of the visual structure which responds to color vibrations remains partially undeveloped. To be color-blind is to have the vision unresponsive to the unrecognized colors.

To be hyper-acute in our sensations is to have them developed and tuned to respond to vibrations beyond the normal average. From this point of view it is easy to understand why some people see and feel and understand things which the average mortal does not.

The normal ear hears about eight and one-half octaves of harmonic sound, while the eye responds to less than one and one-half octaves of light. Above and below these registers our perception of harmony and light ceases, but that the time will come when Man will have a more highly developed organism, which will enable him to appreciate more keenly the phenomena about him, is a fact almost certain of realization.

In vibration lies the factor of personal traits of character in different individuals. Those vibrating in harmony attract each other, while those vibrating in discord are repellent and antagonistic. Some people have the power of changing their rate of vibration and adapting themselves to those about them. This characteristic may be natural or more or less acquired; but in any case, those possessing it often exercise great power for the good or ill of those less fortunate.

People often grow to be alike, both in act and in personal

appearance, from the fact that mutual interests around which their thoughts centre cause their vibrations to become harmonized. On the other hand, those living together unhappily do so because their natures vibrate in discord.

The law of vibration holds true in those descended from a common parentage, accounting for the genius on the one hand, and the feeble-minded on the other. One vibrates at an extremely high pitch, and the other at a rate much lower down the scale.

In harmonic vibration rests the phenomenon of telepathy, and the possibility of prayer reaching the Divine ear. In the one case through the mind of one person responding to the vibrations of another, and in the other case through the mind sending forth impulses harmonizing with the consciousness of God.

Sluggish people vibrate at a much slower rate than those of a more sensitive organism. For this reason they respond more slowly to impulses, and throw out those of a less highly organized character. Especially is this true in the mental sphere. From these facts, we may logically assume, that in vibration lies the secret of why men yield to temptation and the lower passions, becoming drunkards, criminals, and degenerates. Possessed of responsive natures, keyed to harmonize with a low degree of vibratory impulses, they easily respond to degrading influences, and gravitate to the animal plane.

Turning now to a brighter side of the picture, why is it that the great masters in music, poetry, and art have so far transcended the commonplace in the undying classics which they have given to the world?

Beethoven, Shakespeare, and Raphael! Wizards each in the chosen field wherein he stands a type. Reaching up and snatching from the clouds the highest and purest and best! Could mortal minds have interpreted these higher themes had they not been tuned to vibrate in a superconscious key far above that of the average intellect—tuned to vibrate and respond to a rhythm of impulses finer than the grosser consciousness can hope to understand? And the visions of Seers, and the inspirations of Prophets! From whence do they come and why are they sent? Is it drawing too much on the imagination to believe that from some unseen shore they are flashed to earth over the subtle ether waves to minds specially tuned to receive them, and thus given to Man

that his emotions and impulses be awakened, and the vibrations of his soul set in motion toward higher and better things?

Now, of what significance is all this to us as scientific medical men? If it means anything, it must mean that the human body in its normal, or physiological state, is performing its functions in response to rhythmic vibratory impulses, some of which come from the outside of the body, and some emanating from the brain. Granting this, it must necessarily follow, that when the physiological has given place to the pathological, it does so because harmony has been broken, and the waves of vibration are in a turmoil. This offers a reasonable and scientific explanation for the fundamental cause of all diseased conditions.

Accepting this theory as a logical hypothesis, we may assume that the reason for one person being more susceptible to some diseases, and to good or bad influences than another, and also more susceptible at different times, is because the waves of vibration controlling these conditions increase in their activity, or the individual is less able to resist their influence. This being true, we can easily understand how it is that one can, at times, by exerting his will power, overcome both mental and physical conditions, while at other times, and under different circumstances, he is overwhelmed by them. This places us in a position to understand the phenomena of mental healing, and the power of the mind over psychic conditions.

Now, if it be true that in harmony we find health and in discord we find disease, then the course which we, as physicians, must pursue becomes plain before us in dealing with the ills of humanity. We must direct our efforts toward picking up the tangled threads of discord, and so rearrange them that harmony and a normal rate of vibration will be re-established.

And it is along just these lines that we are working with our electrical and physical measures. For whether it be high potential or low potential, high frequency or low frequency currents, galvanism, faradism, Roentgen rays, Finsen rays, the high candlepower incandescent light, or mechanical vibration, it resolves itself into the fact that, one and all, they are vibratory in character and vibratory in effect. And, in fact, is it not reasonable to suppose that all therapeutic measures produce their effects through some form of vibration? What

are the varying degrees of stimulation and sedation but the increasing or the decreasing of the rate of the vibratory waves? Assuming this to be true, then all methods which, through their action, serve in promoting these effects, must of necessity be governed by the same great law.

But, confining ourselves to the special field of therapeutics in which we are particularly interested, the subject under consideration becomes one of great importance to us. We know that if an electric current be passed through living tissue waves of vibration are set in motion which are felt, consciously or unconsciously, wherever the current goes. These waves are positive or negative, sedative or stimulating, regenerative or destructive, depending upon their polarity and potentiality. They may or may not correspond to the normal vibration of the human body, but, if we are dealing with pathological conditions, and are looking for favorable systemic reaction, they must be in harmony with the normal rhythm.

Discussion.

Dr. Granger: This is a paper calculated to make one think. It seems to me that a paper of this sort is needed occasionally to take us away from simply material considerations. Of course we must deal with material considerations at times, but there is more than that. The subject of vibration, as Dr. Davis gives it to us, has a very wide field. I have noticed particularly in the use of the static machine, where we have a pulse unduly high, perhaps of 120, reduced to 80 under the static treatment, and I have also seen the pulse running somewhere around 50 raised to 60 or 65. We have wave lengths vibrating at many rates of rapidity, and find the nerves tuned to respond. Where we have a condition of discord we get from the static machine that which tends toward harmony. I have noticed this particularly in cases where the pulse has been raised; and this condition has remained fairly constant.

Dr. Pitcher: I always thought that if we could get Dr. Davis to give us a paper it would show us a great deal of wisdom. This paper is certainly what you might call classic. I had an idea from the title that it was to be on mechanical vibration. In speaking of mechanical vibration, it is a modality that possibly has stimulated physical therapy as much as any other modality which is used, because the majority of men who use physical therapy usually begin with mechanical vibration. They start in with that, and then become interested in other modalities.

Dr. Allen: I have been intensely interested in this paper. I admit it is way beyond me, but there are various places in which we can study modalities along the lines expressed by Dr. Davis. I think we physicians are very apt to criticise what we term as the laity. Why has Christian Science made

such tremendous progress? You may say what you will of Christian Scientists, but they are not the lowest status of society. They are the cultured of this city in many respects. I believe there is much truth in what Dr. Davis has touched upon, but the question comes, is it practical? When people come to us for treatment are we going into their private lives to find out just what they may be subjected to? And what may be the state of their environment? It is quite a difficult problem. When you begin to touch along the private life of your patients you are running up against a pretty keen edge. But I believe if we could get at the truth the key-note would be struck in many directions.

Dr. Burbank: I want to thank Dr. Davis, personally, for the fine paper which he has given us to-night. I think more papers along these lines would be both practical and helpful. It is well for us to remember that vibration is a great universal law, and as physicians we should be able to apply this law to the human body.

Dr. Reeves: I have given very little thought to the subject. I had never used the vibrating machine until about a year ago, but have had excellent results from its use during that time. The effect of the static wave vibration and the static breeze on the pulse and temperature is very marked. In 1893 a fellow physician and myself started a series of experiments, and for over a year we kept a record of every case. We took a record of the pulse and temperature before the treatment and again after 15 minutes use of the static breeze. In over 95 per cent. of the cases treated, if the temperature or pulse or both were below normal, both were raised to normal at the end of the treatment. If above normal the pulse was, as a rule, brought down to normal, and the temperature likewise lowered. The effect of the static breeze seemed to be to restore to the normal both pulse and temperature.

A lady came into my office about ten days ago, who had fallen and struck the side of her face some time before, injuring herself quite badly. She got well, but two or three weeks afterwards she began to have pain, which increased in intensity, and radiated in different directions. I used the vibrator over a radius of two or three inches from the zygoma for 10 or 12 minutes, with the result that a severe headache which she had at that time, as well as the pain in the face, was almost entirely relieved. I have given her four or five treatments since, and she reports constant improvement. I have been much pleased and interested in Dr. Davis' paper.

Dr. Harris: The subject which Dr. Davis has brought before us in his paper is a most interesting one to me. He certainly struck at the basic principle of all diseases. I believe that all disease is due to some sort of discord. I do not know of any place in the body where vibration is better shown than

in diseases of the ear. The rate of vibration there is noted by the effect of sound when there is a considerable amount of deafness. The tuning fork in testing these cases, I believe, would demonstrate to us, more than any other instrument we use, the effect of vibration. We also find the rate of vibration to be very important in the treatment of a good many cases of disease of the eye. All things, we know, depend upon the rate of vibration.

Dr. Davis: I think most of those present here to-night have a pretty clear idea of the subject under discussion, and of the ideas which I have tried to bring out in my paper. In selecting the subject of vibration to write upon I did so with two objects in view, one of which was to stimulate thought in this direction, and the other was because I believe that it offers us possibilities of vast importance—possibilities worthy of our most careful investigation. In the field of therapeutics we find various systems, schools, and cults, in all of which there are undoubtedly elements of truth. But above and beyond all systems of medicine must exist some basic law for the cause and cure of disease. Does it not seem probable that in vibration we may find this law? One thing is certain, and that is, as physicians, it is our duty to put aside prejudice, and examine carefully, not only that which lies within our domain, but sometimes that which may seem to lie outside of it. We must do this if our patients are to receive the best treatment at our hands. There are certain types of patients with whom we must adopt different methods of treatment than with others, even in the same class of diseases. I have had patients who could hardly stand mechanical vibration, while others have required the most vigorous treatment. It is safe to say that this is true of all therapeutic measures.

Our electrical and physical apparati produce in their effects markedly different rates of vibration, which probably accounts for the beneficial results we receive from their use in such a wide range of pathological conditions.

I was very much impressed with the results of the treatment given to a young lady who came to me several years ago. She had been studying hard, and was in a very nervous state. Among other things, I found on examination that her pulse was running at a high rate. I used the direct current with the positive pole, attached to a small pad, over the cervical region of the spine, and the negative pole, with a large pad attached, over the abdomen. I also used positive electrification for a brief period over the vagi and cervical sympathetic nerves. After about 15 minutes treatment the pulse rate fell from 160 to a rate below 80 per minute.

I wish to thank the members present for their attention, and for the kind words and sentiment which they have expressed in the discussion here to-night.

CANCER AND ITS TREATMENT BY CATAPHORIC
STERILIZATION.

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(Continued from page 633, December, 1907.)

CHAPTER IV.

THE PHYSICS OF THE CATAPHORIC STERILIZATION PROCESS, AS
EMPLOYED IN THE DEVITALIZATION OF DISEASE AREAS.

A clear conception of the electro-chemical reactions occurring in living tissues during the employment of the method described in the preceding chapter requires some attention to the phenomena of electrolysis. These phenomena are under very active study at the present time, both from theoretical and practical points of view. The theoretical aspects of the subject have been studied anew, since 1887, by Van't Hoff, of the University of Berlin, and by Arrhenius, a Swedish physicist, resulting in entirely new conceptions of electrolysis and its correlative sequences: anaphoresis and cataphoresis. The practical aspects of the subject have been even more comprehensively developed in the immense strides made in the manufacture of synthetic compounds and electrolytically separated chemicals in Germany and at Niagara Falls, at the latter place the current from the great power plant being utilized for the purpose.

The basis of the method employed in the cataphoric sterilization of diseased foci is the fact that the living tissues, particularly the highly cellular and vascular growths under consideration, are made up of various salts in organic combinations held in solution in water. The large proportion of water present is shown by the fact that, by weight, the soft parts are three-quarters water and but one-quarter solids.

Now, these newer facts of electro-chemistry teach us that when a salt is in solution in water it is, in a sense, no longer a salt as we know a salt in the dry state, but an ionized solution of the atoms of which it is composed. That is: that the molecules of chloride of sodium, for instance, are largely dis-

sociated when in solution in water, the atoms of chlorine and sodium, as well as most of the component atoms of the water molecules themselves, being no longer simple atoms, but, by reason of possessing an electric charge, ions. The hydrogen of the water and the sodium of the NaCl possess a positive charge, and hence tend to seek the negative pole if a current of electricity traverses the compound; they are therefore called cations. The oxygen of the water and the chlorine of the NaCl possess a negative charge, and are hence anions, or anode seekers. Whether a current of electricity is passing through such a solution or not, this dissociated or ionized condition of salts and most acids and bases exists whenever they are in solution in that great solvent, water, without which neither chemical action nor life itself could continue. Such solutions are known as electrolytes.

Water itself is but slightly dissociated or ionized unless it contains a trace at least of some one of these substances; therefore pure water will not conduct electricity, since it is the ions alone that conduct this force. As a side remark, it may be said here that watery solutions of many substances do not conduct electricity because these substances are not ionized by this solvent.*

To return to the question at issue: When a current is passed through the ionized or dissociated body of molecules constituting the basal constituents of a living growth, a powerful directing movement is given to the ions everywhere present, the oxygen, chlorine and other anions being impelled toward the anode (the active electrode, or electrode within the growth) where they give up their — charge, becoming simple atoms. These atoms, no longer in the condition of ions, attack the least refractory elements of opposite sign at hand, in this case the mercury and zinc of the electrode, or the mercury alone if it is held in place by a gold electrode, forming oxides and chlorides of the metals. These metals being now in solution in water and thus ionized, are but lightly held by the oxygen and chlorine, and being themselves charged with + electricity, become cations, seeking at once the negative pole on a distant portion of the body. The released oxygen

* An instance of this is sugar, a solution of which in water will neither conduct nor be electrolyzed by an electric current, showing the low value of this substance in the life chemistry of the body.

and chlorine remain near the active electrode, forming water, hydroxyl and other compounds, while the mercury and zinc ions radiate outwards, uniting and dis-uniting in turn with the oxygen and chlorine of the tissues as they spread, destroying the vitality of cells and germs as they proceed, since zinc and mercury in the ionized state are poisonous to protoplasm. As their progress is relatively slow they do not reach a great distance, betraying their course by a characteristic grayish white necrosis wherever sufficiently dense to do so.

The exact nature of the diffused salts has been determined by Gautier, of France, with reference to copper, which was found diffused as both oxides and chlorides when living animals were subjected to the process. That there is an abundance of combined oxygen for these purposes in the soft tissues of the cancer is shown when we remember that 72 per cent. of the body as a whole is composed of oxygen (Marshall).

Turning to the reactions simultaneously occurring at the negative pole, resting in good, moist contact with a distant portion of the body surface, it should be noted that an exactly equal amount of electro-chemical change occurs here, though of opposite sign, hence this electrode contact must be very large in order that the reactions, by being spread over a great surface, may not do more than stimulate the skin and underlying tissues. The cations that actually reach this electrode (during the moderate time that the process is employed) are the sodium, potassium and other bases of the nearby tissues, which, approaching the tin plate as cations, give up their charge and lose themselves as atoms of these bases in the abundant water of the large pad interposed between the tin plate and the body surface, the water itself being dissociated into oxygen and hydrogen. Of this dissociated water the oxygen is diffused inwards into the body as an anion while the hydrogen appears free as a gas. The only real accumulation of cations in the pad, of any moment, are therefore the free alkaline bases, and these do no harm to the skin if the pad is thick and sufficiently broad.

The interpolar tissues of the general body traversed by the current suffer no change, other than a general quickening of the chemical processes.

Recurring to the electrochemical changes at the site of cataphoric diffusion within the growth, the anodic region of

the body electrolyte, it should be said that the nearer a given cell or germ lies to the electrode the denser will be the flow through it of the zinc-mercury cations, resulting in more certain destruction. In the actual conditions encountered in practice—the use of a third of an ampere to one ampere during a time varying from a half hour to one hour—the sterilizing cations never reach the relatively distant cathode on the patient's back. The most distant are probably but one or two inches (three to five centimeters) beyond the point where their density ceases to devitalize all the tissues (at which point the line of demarcation will develop several days later). It is in this wider circle of less dense diffusion that the purer effects of reaction without necrosis occur, the lowly constituted malignant cells being destroyed alone for probably a half inch beyond the point of total destruction, while a portion at least of the normal cells are only subjected to a strong irritation.

The speed at which these mercury and zinc ions are made to traverse the tissues has not yet been accurately determined, but is dependent on the voltage of the current, the amount transferred being dependent on the amperage. Kohlrausch discovered that each atom has its own rate of motion in a given liquid, independently of what it may happen to have been combined with, hydrogen traveling faster than any other atom. Lodge* gives the subjoined table of the speed of atoms of the substances mentioned when urged by a potential of one volt per lineal centimeter of electrolyte.

Table of Cataphoric Speed of Ions at One Volt per Centimeter.

Hydrogen	1.080	centimeters per hour.
Potassium	0.205	centimeter per hour.
Sodium	0.926	" "
Lithium	0.946	" "
Silver	0.166	" "
Carbon	0.213	" "
Iodine	0.216	" "

The two substances in which we are most interested, mercury and zinc, are unfortunately not mentioned in this table, though all atoms probably have a rate bearing some relation

*"Modern Views of Electricity," Lodge, p. 87.

to their combining equivalents, as suggested by Prof. Dolbear in a conversation with the author. This question is one of great importance in the clinic room, and so far as concerns mercury, it may be roughly said that 5 grains (1-3 gram) of metallic mercury will be diffused one centimeter into the flesh by a current of 50 milliamperes at 50 volts in ten minutes. By doubling the voltage the same current should transfer a similar amount of mercury twice the distance in the same time. If these figures are only approximately correct it will be seen that not only are currents of large volume required in this work, but they must be at a sufficient pressure and maintained long enough for the lethal material to reach the outlying portions of the growth, and particularly the branch-like prolongations. The completeness of the protoplasmic devitalization is due to the density of the current, it is true, but no matter how densely a strong current may diffuse the medicament, a sufficient time must be allowed for its due penetration, and the prompt devitalization of the affected cells in the more distant portions of the growth. This may be assisted at times by the use of more than one active electrode; in fact this should invariably be done in the larger growths, in order that the time in which the patient is kept under anesthesia be lessened, but it should not be forgotten that each additional active electrode will necessitate a corresponding increase in the current to keep the local action of each electrode up to a properly effective concentration. Two electrodes will require twice as much current as one, and three will require three times as much.

The use of too many electrodes, or of a broad, active surface pressed against an ulceration, has the disadvantage of either dividing up the current into ineffective portions, resulting in a lack of concentrated action, or of requiring more current than convenient to make each effective. The author's experience has shown also, that a moderate amount of the ions inserted beneath the surface, directly amongst the cells, by means of a puncturing electrode, is more effective than much more material diffused from a broad electrode placed against the surface.

EXPERIMENTAL DEMONSTRATION OF MERCURIC DIFFUSION WITHIN FLESH.—To demonstrate the diffusion of mercuric salts within beef is both interesting and easy. The piece of beef should

be of sufficient size, fresh, and preferably made up of muscular tissue or other non-fatty parts. It should be laid on a porcelain dish or other non-conducting surface, and a metallic instrument of any metal thrust into one end connected with the negative cord of the battery. The active electrode must be of gold, well amalgamated with mercury, and after it is thrust into the opposite end of the beef an additional supply of mercury should be poured or dropped on it so that it will not become bared by the action of the current.

From five hundred to one thousand milliamperes should now be turned on from an appropriate source and maintained about fifteen minutes. The meat nearest the anode will be seen to change color at once, very much as in living flesh, the discoloration radiating in all directions from the electrode but mainly towards the opposite pole. When sufficient effect has been obtained the current is turned off and a longitudinal section of the meat is made, passing through the points at which the electrodes were inserted. The extent and effect of the diffused chemicals can then be easily traced, so far as these can be shown in dead flesh. The limits of the area of sterilization can be easily made out, shading off into unchanged surrounding flesh, but the zone of infiltration-reaction, as it would be in living tissues, can only be traced in part by the discoloration produced by the chemicals. To discern what would be its extent the following expedient may be employed: Remove the electrodes and cords from the battery and connect a pair of copper wires to the binding posts of the battery, the wires being bared and brightened at their ends. With the same amount of current turned fully on these wires (500 to 1000 ma.), their ends should be held about a centimeter apart and pressed into the beef for some moments at various points, beginning near the negative polar region and gradually working towards the positive polar region. As soon as a portion of the meat is reached holding the mercuric salts, even though in insufficient quantity to cause discoloration of the meat, there will be a deposit of metallic mercury on the *negative* copper wire, shown even in small quantity by the silver color of this wire compared with its fellow, and proving the extensive penetration of the chemical.

(To be continued.)

Editorial.

THE PROFESSIONAL MIND WITH REFERENCE TO THERAPEUTICS.

FOUR conditions of the professional mind must be evident to the readers of current medical literature, as follows: (1) A nihilistic school which would seek to destroy confidence in the therapeutics of medicine without substituting other methods; (2) Those who are disposed to taboo or disregard any mention of electricity or other physical measures; (3) Those who appreciate the value of one or more methods and find them sufficient, and those are beginning to feel the importance of adopting means more rational to assist the therapeutics of drugs; and (4) An increasing number of broad-gauged physicians who are earnestly investigating all therapeutic measures that in each case they may employ the one which best conserves the indication.

Of the first school, the greatest exponent to-day is Dr. Osler, who would seem to have about abandoned therapeutics, devoting his teachings to diagnosis and prophylaxis. The latter must be recognized by all to be of greatest importance; but where is the value of diagnosis without the institution of some therapeutic measure to relieve the condition discovered. Osler is quoted as having said to an audience of medical students, "Be skeptical of the pharmacopeia. He is the best doctor who knows the worthlessness of most medicines. Study your fellow man and fellow woman and learn to manage them." It must be said of Dr. Osler that at least he is honest in his intentions, but that he is short-sighted when finding "most drugs a failure and a few drugs only to a small degree useful"; that he is not alert in finding other methods more efficient for the relief of functional derangements. A knowledge of pathology often suggest the futility of any therapeutic intervention where organic changes have occurred. The *vis medicatrix naturæ* cannot always be relied upon to replace therapeutic intervention, for nature must at times be aided and may to

the extent of effectually restoring to normal the functional derangements.

Those who disregard and oppose the mention or institution of physical measures with which they are not familiar, comprise the narrow class of egotistical individuals who are not open to conviction, but willing to remain ignorant of advances in other directions. These as a rule, with their ignorance and egotism, assume a dishonest rôle towards their patients, too often justifying themselves in the eyes of the profession, but not of the public, by criticising and ridiculing those who know.

The third class constitutes two sorts: Those who from understanding and appreciation of one or more methods are satisfied with a limited armamentarium, of these the surgeons constitute the larger class, and a smaller number include the pseudo physio-therapists. Others are beginning to feel the importance of finding out something more rational and seeking to fortify what they recognize as the unsatisfactory therapeutics of drugs.

Dr. Wm. Sidney Thayer, Professor of Clinical Medicine in Johns Hopkins Medical School, in a recent number of the Bulletin, has said: "We have been delegating the application of these important methods of treatment (the physical measures) to the trained nurse and the surgeon, while standing aloof in some instances with pharasaical pride in the point, that; we are not as the osteopaths—we use our heads only—not our hands—an attitude which is a fatal stumbling block in the *art of medicine*.

"Must we not, on reflection, be painfully conscious that not one of us has ever been properly trained in massage, and that few of us are familiar with the many ways in which hot and cold water may be used with advantage? The student as well as the nurse should be trained in hydrotherapy, in massage, regulated movements, and in electrotherapy."

It is reassuring to know that the successors of Osler at Johns Hopkins are awaking to a serious consideration of the import-

ance of the institution of physical therapeutics by the profession at large.

What is most reassuring, however, is to find in the field of therapeutics an increasing number of broad-gauged physicians who are not disposed to abandon recognized medicinal remedies, the utility of which has been tried and proved, but who, at the same time, are earnestly investigating and employing not one, but all of the recognized physical and other measures, striving constantly to employ each in its own field of indication and working in unison with other members of the profession who are seeking to build up by earnest investigation a rational therapeutics which shall stand the test of time. If the same degree of energy was expended to enlighten the minds of the profession as to the importance of the general recognition of the value of physical therapeutics as is being employed on behalf of the therapeutics of drugs, as great, or a greater benefit would be derived by humanity from such an attitude than from the institution of the following resolution, adopted at the last meeting of the American Pharmaceutical Association:

"Resolved, that it is the sense of the American Pharmaceutical Association in convention assembled that a great advance in the ethical practice of medicine and pharmacy will be made when the medical colleges make the pharmacopeia a prescribed text-book or book of reference and require familiarity with it in their examinations.

"Resolved, that we request the governing authorities of all medical colleges in the United States to put in force such a ruling in their respective institutions as will insure in future classes a well-grounded knowledge of materia medica and pharmacognosy as set forth in the pharmacopeia."

Between the heresy of Osler and Holmes and a scientific application of physical measures, is a middle ground that would have ample space in a volume not one-fourth as pretentious as the United States Pharmacopeia.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The Treatment of Tuberculous Disease with the High Frequency Current. By Dr. H. Thielle of Rouen. New York Medical Journal, July 20, 1907.

Dr. H. Thielle, a recognized authority in the employment of the high frequency current, has carefully collected observations of 26 cases of tuberculosis treated by electricity. The investigations were carried out with great care and carefully compiled. He maintains that the chemical exchange in respiration is higher in the tuberculous, in their descendants, and in persons predisposed to tuberculous disease than in the healthy.

He comes to the conclusion that the high frequency current has a manifest action on the chemistry of the respiratory function. "It augments the respiratory volume, and diminishes the production of carbonic acid and the total consumption and absorption of oxygen by the tissues; it therefore increases the coefficient of oxidation, lowering that of absorption. This action is not only momentary; it continues to be felt after the suspension of treatment. In general metabolism the high frequency current augments the acidity of the urine, lowers or raises, according to the individual case, the coefficient of nitrogen oxidation, and arrests demineralization. The proportion of the hemoglobin is augmented, and the number of red blood corpuscles is increased, while the leucocytes decrease in number, but gain in strength, the quality making up for the decrease. The tubercle bacillus finds therefore a less convenient ground on which to develop, and the blood-creating organs are not forced to produce an increased amount of defenders against the attacking enemy.

"The general condition of the tuberculous improves under the treatment. The respiration becomes easier and the inspiration is fuller. The patients experience a sense of stimulation, due to the penetration of air into the lungs. The feeling of oppression, the dyspnea, disappears. The cough is less aggravating, and the attacks become fewer and finally cease; however, sometimes in the beginning of the treatment a dry cough and dyspnea will be produced, in consequence of the direct application and the ozone, but the body soon becomes accustomed to them and the disagreeable effects disappear. The expectoration becomes easier and less frequent, and soon

stops. The sleep is better, even during the first few nights; the night sweats diminish and disappear at about the fifteenth application. The appetite returns and increases at the tenth treatment. The digestion is good. The patient gains strength and is able to perform his work. The weight of the patients varies, but all the cured kept their weight, which was greater at the end than at the beginning of the treatment. The bacillus disappears, sometimes during the first months of treatment, sometimes later. It was never found in the patients after they were discharged as cured."

Treatment of Raynaud's Disease with High Frequency Currents.

In the July number of the Bulletin of the French Society of Electro-Therapeutics Dr. Bounejoy of Cannes contributes a very interesting article on the treatment of this disease and cites five cases treated successfully, two being completely cured. The condensor couch was used for ten-minute séances.

The patients were all females, four being English and one French. Two were 34 years of age, and the oldest was 62 years.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

The silence of the editor of this department is in no sense to be accounted for by lack of interest in the subject of phototherapy or of practical work constantly being done with the energy of light, but solely because all the available moments have been filled to the brim with the many duties of a very active professional life.

Of the various manifestations of radiant energy, light occupies the place of greatest practical importance and in some form is at the command of every physician desiring to use it therapeutically. Nothing is so important as the influence of light upon the circulation. The following cases illustrate this point very clearly. In April, 1906, a woman, age 40, of tubercular family, and for eight years in charge of a tubercular sister who died, came under care. She was suffering great distress from recurrence of hemorrhoids operated upon some years previously, and also from rectal hemorrhage with distressing tenesmus. Fully a cupful of blood was lost daily, not all at one time but as a rule within the morning hours. Its passage was accompanied by great distress, bearing down, and exhaustion. The thickened hemorrhoidal fringe, so to speak, about the anus and the entire rectum was exquisitely sensitive,

while the patient's endurance was worn to the limit. She was waxen to translucency, breathless, and exhausted upon exertion, appetite impaired, sleep broken, unable to walk or stand, and confined to her room until about the middle of the day, and but little fit to go about in the latter part of the day. A rectal fissure was diagnosed, and although the presence of tubercle bacilli was not established microscopically, there was no question either in my mind or in that of the physician who had formerly operated for hemorrhoids and who was in constant touch with the patient, but that the condition was a tuberculous one.

The patient's diet, hygiene, and sanitation were carefully looked into. They were really of the best, as her tubercular tendencies had been fully recognized. She had been continually under medical treatment for months before coming to me and passed directly from her physician's hands into mine. Bowels were constipated, a condition induced in part by her terror of having a movement because of the pain and tenesmus.

An attempt was made to make rectal bipolar applications of the induced current or else rectal monopolar applications, vacuum tube electrode, of a high frequency current, but the sensitiveness and distress were so great that neither the one nor the other could be borne. After a trial or two all idea of treating the hemorrhoids directly was given up and attention directed to arresting the hemorrhage and building up the patient's general health. To this end light was used and prolonged abdominal, precordial, and spinal, especially lumbo-sacral exposures were made. Exposures were fully forty-five minutes in length to the energy of a 25-ampere marine searchlight or projector at its focal point, screened or not by the intervention of a blue glass screen, according to the patient's tolerance of heat. Inside of two weeks the rectal hemorrhage was under control. This absolute cessation has continued for twenty-one months. Treatment was given over a period of two months. The patient gained 12 pounds during the following summer. Her appetite was good, her strength greatly increased and also endurance. In the spring of 1907, as the local sensitiveness was very much lessened by reason of her improved physical condition, rectal bipolar applications of the induced current, secondary, from a coil of many turns, fast interruption, were made to the patient's tolerance for from ten to twenty minutes and from daily to every other day over a period of two months. These applications resulted in control of the hemorrhoids. They were no longer protruded, swollen, nor, for that matter, in evidence. She has gained in weight, strength, and endurance, to her own great satisfaction and the astonishment of her friends and medical attendant. In December, 1907, the patient reported that she had been and was per-

fectly well throughout the summer. She looked the picture of health.

Control of the hemorrhage by the profound influence of chemically active light upon the circulatory apparatus was secured without local treatment of any sort or description.

In the winter of 1906 a woman, age 43, married, suffering from excessive uterine hemorrhages, came under care. She was profoundly anemic, constipated, waxen to translucency, breathless upon the slightest exertion, and only reached my office by the greatest effort. There were menorrhagia and metrorrhagia of several years' standing, for which she had been curretted "five, six, or seven times." So frequent had been these currettements that the patient said she lost count of the actual number. I was unable to elicit from her the cause of the hemorrhage for which the initial currettement was made. She had been under medical care continuously for several years and was transferred to my care during the illness of the then attending physician. Local and general measures had been used but without result. Upon examination no lesion was found but a somewhat enlarged and atonic uterus. The elasticity of the circulatory apparatus of the endometrium as well as the entire organ had been profoundly affected by the frequent currettements. I forbade the use of the daily and semi-daily hot douches which had been ordered, stopped all local treatment, looked after diet, hygiene, sanitation, and exposed the entire body superficies to the energy of the 25-ampere arc for fully forty-five minutes three times a week. Very careful localizations were made to the precordium, the solar plexus, abdomen, hypogastrium, and entire spine, especially lumbo-sacral region. Inside of four weeks the hemorrhages were controlled, and when I last heard, over a year following treatment, remained under control. Appetite improved, bowels became regular, nerve irritability lessened, strength and endurance increased.

In hemorrhagic conditions dependent upon a fissure, even though tuberculous as in the case instanced, by the physiological action of light upon the circulating media and the tonicity of the blood vessels the nutritive changes necessary to its healing are established.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Treatment of Acne and Chronic Eczema. By Russell H. Boggs, M. D. The Journal A. M. A., August 31, 1907.

The doctor goes rather minutely into the subject of success and failures in the treatment of these conditions. He makes

an effort to show the indication and contra-indication of the Roentgen rays in these cases. He insists that in the employment of the Roentgen rays in dermatology it is as necessary to know the pathology of the treatment as it is to know the effects of the agent used, and one must be able to vary the dosage of the ray to suit the individual conditions as they arise. He quotes in full the replies of Dr. Neuman of Vienna, and Dr. Leslie Roberts of Liverpool, England, to show the absolute divergence of opinion in regard to this treatment even at this time. As these answers are so very divergent, I will quote both of them in full.

Dr. Leslie Roberts, Liverpool: "In reply to your questions relating to x-ray treatment, I may say that I consider the treatment of acne rosacea, eczema, or psoriasis by the x-rays to be irrational, improper, and utterly inadmissible on scientific grounds. I am afraid that those who talk of 'curing' these diseases by rays do not clearly understand the nature of these diseases."

Prof. V. Neuman, Vienna: "I have had a great deal of experience with radiotherapy in acne, acne rosacea, eczema, and psoriasis. There are cases which cannot be treated properly otherwise. Of course I use our old methods in combination with Roentgen rays. Acne of the face and back is often cured radically by a few sésances, but acne rosacea with tumefaction of the nose is only very little improved.

"Chronic eczema, wet and dry form, yields often quickly to the new treatment, but not ulcer of the leg. Psoriasis in its chronic patches ought to be exposed strongly to the ray. The acute, disseminating form needs only weak sésances. The disease is not cured radically, though. The rays ought to be handled only by specialists: if there are none at hand, the rays ought to be replaced by the older methods of treatment, but a specialist, with much practice, will, by the use of the dose meter of x-rays (Sabouraud, Noire, and Kienbock with milliamperemeter), always avoid burns; therefore in his hands radiotherapy will never prove harmful."

Dr. Boggs has visited a good many skin clinics during the past year and says that it is easy to understand in watching the manipulation of the different clinics how many failures take place. Some are painstaking and know what they are doing and success follows their efforts, while others are careless and ignorant and a long train of failures is bound to occur.

Acne.—After a faithful trial in the mild cases of two months ordinary treatment, followed by no improvement; he generally applies the ray, but in pustula and indurated acne he loses no time, but uses the ray at once. From the x-ray he considers the hope of preventing recurrence in these cases. The local treatment of acne consists in removing the comedones, infiltrates, and abscesses. He uses as aids in this condition

resorcin and naphthol paste or by painting with tincture of iodine. The x-ray is considered the best agent in removing the comedones, which takes place usually after the first few treatments due to its stimulating effect and is followed by desquamation, and thirdly, there is a decrease in the size of the sebaceous glands. He believes that the mild cases can be cured by medication, but they have very little effect in decreasing the over-active sebaceous glands. In pustular acne the ray seems to destroy the staphylococci, rendering the soil inert. In treating acne great care must be taken to produce no undesirable results. A low vacuum tube should be used and it should be kept low. He prefers a tube so low that it will scarcely show the bones in the hand and places it at about eight or ten inches from the skin and gives from five to ten minutes' exposure, according to the condition of the patient, until nine treatments are given, by which time he is supposed to be able to judge the quantity necessary to cure the patient.

Acne Rosacea.—While this form is more resistant, it yields better results where glandular inflammation predominates. The ray causes an atrophy of the sebaceous glands.

Eczema.—While internal treatment is sometimes necessary, the vast majority of chronic cases are relieved by the local use of radiant energy. The ray is certainly not indicated in mild and acute cases. But in many chronic and rebellious ones, which have resisted all measures, x-rays have proved very efficient, especially in squamous eczema. It requires intense radiation to relieve the pruritus and papular eczema. There is a greater tendency to recurrence in this form of the disease than in any other. It has been noted that the x-ray is followed by less pruritus and discharge.

The Therapeutics of Tuberculosis of the Skin. By Granville MacGowen, M. D., J. A. M. A., August 31, 1907.

The author devotes one column of one page to phototherapy, radiotherapy, and heliotherapy, and while he speaks very favorably of them he devotes very little space in his article to these agents. Finsen's method, he well says, is a treatment only for the very wealthy or the very poor. He says radiotherapy in the hands of skilled Roentgen operators has accomplished wonders in the treatment of lupus. "I have time and again seen it cure tuberculous fistula, soften and break down the dense scars of sclerosed lupus and melt the scrofulo-tuberculous gumma about the mucous orifices, where repeated surgical measures had failed to cure." He has often failed to destroy more superficial forms of ulcerated tuberculosis of the skin and has seen epitheliomatous changes twice take place requiring surgical removal and many other failures from the x-ray.

Roentgen Ray Technique in Dermatology. Mihran K. Kassabian, M. D., Jour. A. M. A., August 31, 1907.

He considers the ray in dermatology valuable and its place firmly established. He thinks that a dermatologist must be an adept at his work and that the hand of the tyro holds no comparison with the experienced operator in this field of work. He called attention to the "embarrassing inconsistencies"—as a certain learned authority called it—in not using low vacuum tubes, while another of equal celebrity decries low vacuum tubes and uses high vacuum tubes only. Some condemn the repeated and gradually ascending serial irradiations using massive doses only, while others give anywhere from one to six treatments a week, believing massive doses ineffective and dangerous. There are some who try to produce an erythema in every case, while others think it absolutely wrong. Coupled with these flagrant contradictions come in the varying opinions as to the distance at which the tube is placed, which vary from contact to forty inches and even more. He classifies the dermic lesions as follows:

(1) Where slight stimulation is required (*acne*). (2) Where epilation is necessary (*hypertrichosis*). (3) Where absorption of pathologic tissue is desired (*eczema*, *psoriasis*, and *lupus*). (4) Malignant types of disease (*epithelioma*).

The technic varies with the special character of the lesion to be treated and can be accomplished by varying both the quantity and quality of the rays. In superficial cases the rays should be mild in character, producing a slight stimulation, causing a constructive instead of a destructive action. In deeper structures he thinks a hard tube should be used. Distance of tube from the patient depends upon the quality of the tube, the size of the area to be treated, and also whether a rapid reaction is desired or not.

He gives very careful instructions in regard to stimulation in *acne* and reports the results obtained to be excellent. His treatments are given with a low vacuum tube. Three exposures a week are administered for two weeks of two or three minutes each, and he does not even find it necessary to produce an erythema.

In *hypertrichosis*, he gives just enough treatment to cause a gradual atrophy of the hair follicles without producing any erythema. In the third case where absorption is required, more intense raying is demanded, longer exposures and closer distance bring about greater reaction. In the fourth class of diseases, where the *epithelioma* has grown rapidly, he advises immediate operation and subsequent radiation.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Errors in the Diagnosis and Treatment of Diseases of the Skin.

From a Lecture Delivered at the Skin and Cancer Hospital.

By L. Duncan Buckley, A. M., M. D. Published in the Therapeutic Gazette.

We are always pleased to read any of Dr. Buckley's articles. His vast experience and sound judgment make his writings of the utmost value. As a diagnostician he stands without a peer. He treats a diseased condition, not the name of a disease. He regards many manifestations of disease on the skin as serious. They should not be treated lightly, as is likely to be the case, and say, "Oh, it is only some skin trouble," and prescribe only arsenic and zinc ointment. In speaking of arsenic he does not believe it to be a panacea for diseases of the skin; as experience has shown that it has relatively little if any effect on most eruptions. He speaks of the error of not recognizing the fact that a patient may have more than one cutaneous ailment at the same time, and that one of them may mask the other and create confusion in diagnosis.

Syphilis has been called the great imitator, its lesions may simulate and resemble those of many other skin affections; many errors, therefore, constantly occur in regard to its diagnosis. For instance: In not recognizing the nature of the initial sore, especially in extra-genital regions, such as chancre, herpes progenitalis, balanitis, etc. Extra-genital chancres on various parts of the body present varying aspects, and errors in regard to their diagnosis have often occurred, and chancres of the lip and the eyelid have frequently been excised as epitheliomas. On the tongue they are often thought at first to be epithelioma. Occurring on the bearded face, by infection in shaving, they have been treated for parasitic cystosis. The lecturer mentioned errors in mistaking an eruption produced by iodide and bromide of potassium for one caused by syphilis. Later in syphilis one constantly sees errors, more commonly in the failure to recognize the disease when existing, but also occasionally in regarding non-specific lesions as syphilitic. In cases which are at all doubtful any amount of energy and patience should be expended in order to make a correct diagnosis. Dr. Buckley mentions a case which came under his observation: "A gentleman, aged forty-five, was sent me from a distant city with a mass of ulcerative disease about the lower abdominal region, groins, upper thighs, and buttocks which almost defies description, and which had been variously diagnosed. The trouble, which had begun on the scrotum ten

years before, had progressed steadily all the time up to his visit, in spite of continuous and most varied treatment from many physicians. This had included long courses of x-rays and Finsen light, injections of antitoxin twice a week for four months, all kinds of local treatments, including cauterizations, and latterly it was seriously proposed to excise the entire area and treat it with skin-grafting. There were in all several dozen inches of deeply ulcerated surface. To be brief, syphilis had never been suspected, and yet the entire surface was absolutely healed at the end of three months, under very active mixed treatment, with absolutely no local applications except absorbent cotton, and the use of peroxide of hydrogen twice daily." The doctor says that "late syphilitic lesions about the face are most commonly mistaken for lupus and epithelioma," and he has seen very many thus treated, often with x-rays in late years, quickly yield to proper antisyphilitic treatment. Epithelioma will sometimes develop upon an old syphilitic lesion, especially on the tongue, and the diagnosis may then be very difficult. Scabies is the cause of many errors, as well as pediculosis both of the scalp and body; in a number of cases of prolonged itching, with some raw lesions about the scalp and ears, the trouble had been regarded as eczema, but was found to be syphilitic and quickly cured with the correct treatment.

Quite a common error often occurs in regard to chronic erythematous eczema of the face, which is mistaken for "chronic erysipelas." The same mistake is made frequently in diffuse acne rosacea. There is also a pseudoerysipelas, a diffuse lymphatic infection from nasal disease, which recurs again and again about the face and nose, which is wrongly called true erysipelas. Its whole course is quite different from true erysipelas, and if it is so designated and its real nature is not recognized, and if the nasal cavity is left untreated, the trouble may recur indefinitely.

The speaker emphasized the fact that much time and care should be bestowed on dermatological cases, the individual primary and secondary lesions should be studied carefully, the whole surface being examined, and the history accurately learned; also a mental process of exclusion of other possible eruptions at all similar should be made, and the diagnosis established with certainty before prescribing. He thinks that much of the unsavory reputation which diseases of the skin have for chronicity and rebelliousness is due very largely to errors in diagnosis and treatment. Even if the diagnosis is correctly made too little thought and study is given to the treatment, the patient being put off with some local application and little else. Too little attention is paid to the patients themselves, to their physical condition, and the performance of their functions of life. He continually finds patients with various

skin troubles to be in a deplorable state as far as their digestion, metabolism, and elimination are concerned, their dietary and hygienic conditions all wrong. Although many diseases of the skin are more or less rebellious to treatment, and many of them show very little tendency to self-limitation, at least while the patient remains in the same conditions of life as before, or until the skin is forced into a healthy action by vigorous and prolonged treatment. In the errors of treatment he condemns all quack and semi-quack applications, also the thousands of proprietary remedies pushed upon the profession by skillful agents. It is an error to expect too much from local treatment alone, and also to expect immediate results in many cases.

After speaking of the instructions the patient should receive, and cautioning against the use of too strong local applications the speaker closes the lecture as follows: "All of us know that errors are constantly occurring in connection with the use of the x-rays in the treatment of diseases of the skin; but those who have watched the brilliant results obtained in many cases in this clinic during the past few years do not need to be told of their value when properly used in appropriate cases. This plan of treatment has passed its experimental stage, and is certainly a most valuable adjunct to our armamentarium, but it must always have its danger of burning in inexperienced hands, and no one can be too cautious in handling it. But it is an error to use it too exclusively or to expect that its range of usefulness will extend to very many affections."

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Experience with Opsonins and Bacterial Vaccines in Treatment of Tuberculous and Non-Tuberculous Arthritis.

C. F. Painter (Boston Medical and Surgical Journal, November 7, 1907) reports his results in a series of eleven cases treated during the last year and a half. In two cases he obtained marked improvement, and in another fair. In four cases there was no improvement. Two cases died, and one was dying when the paper was written. One case became distinctly worse and it was an open question whether the treatment was not responsible for it. These were the tuberculous cases. In the non-tuberculous cases no really satisfactory results were obtained.

Specific Therapy Against Tuberculosis.

H. Schroer in the Lancet-Clinic for November 9, 1907, takes a decided stand against the various kinds of specific inocula-

tion therapy now in use for the cure of tuberculosis on the ground that "the premises appear unsound inasmuch as injection of extraneous materials into an organism having a localized area of disequilibrium occasions reaction in the diseased tissues and not in the normal." Regarding the methods which have for their object to increase phagocytosis in the diseased area, he thinks that the possibility that the bacilli ingested by the leucocyte are not necessarily dead should be borne in mind, especially in tuberculosis, in which one of the frequent ways of dissemination of the germs through the body is by phagocytes, which are destroyed by the bacilli they are carrying, a new focus developing at the site of destruction. He is now working on a method,—still in the experimental stage,—which he has devised for modifying the tubercle bacilli so as to render them susceptible to catalysis in the diseased focus.

Tuberculin Treatment of Tuberculosis in Children. British Medical Journal, October 26, 1907.

C. Rivière reports very satisfactory results in the treatment of pulmonary and peritoneal tuberculosis. His doses are for a child of one year, one-twelve-thousandth to one-eight-thousandth of a milligram; for a child of five years, one-four-thousandth of a milligram; for a child of ten years, one-three-thousandth of a milligram.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

CHAPTER I.

Introduction.

A demand by the members of the profession for elementary literature on the employment of the so-called physical measures in therapeutics, and the repeated complaint that the published papers, pertaining particularly to electro-therapeutics, are too technical for beginners, have led to the belief that the publication of a series of papers prepared for the purpose of defining the practical employment of these modalities, might be appreciated. It will be the intent in the series to treat

each subject by defining the peculiarities of the modality, its methods of application, and therapeutic indication, as fully as the scope of the work will permit.

Physical therapeutics include the employment for treatment purposes of natural physical agents which properly comprise all forms of vibratory energy, including mechanical vibration, heat, cold, light, the Roentgen rays, and all types of electrical modalities, massage, exercise, and also, as a part of every régime, attention to diet and the regulation and correction of habit.

During all ages most of these measures have been acknowledged as having therapeutic value, and some physicians in every age have recognized and employed one or more of them; but in no age has their importance been impressed upon the teaching body of the profession to a degree that has led to their proper recognition in general therapeutics.

The medical profession has followed the early fathers, ever seeking a *medical* remedy for the relief of human ills. Science has developed, one by one, the inconsistencies of the older forms of therapeutics, and the leaders of medical thought have removed, one by one, the bricks which supported the ancestral structure of medicine, imperiling its downfall.

The surgeon with mechanical precision has sought to replace waning medicine by the removal and repair of offending organs or parts.

Organotherapy has taken a place in therapeutics which gives promise of fulfilling many indications particularly in the treatment of infectious conditions.

The scientific study and improved means and methods of diagnosis have made possible the recognition of pathological conditions which together have afforded the profession means of understanding the relation of diseases and their causes, often demonstrating the therapeutic futility of drug administrations, particularly for the destruction of germs or the relief of congestion generally. At this time the ability of physical measures to accomplish both is becoming rapidly more and more apparent. The establishment of these truths is certain in a few short years to raise these methods to the recognition and esteem of all progressive physicians and to lead to their general introduction for the relief of human suffering. To the uninformed such statements seem presumptuous; but there are

many members of the profession who are led to believe that by the scientific employment of physical therapeutics for the cure of disease, more will be accomplished in the future than from other measures. *Prophylaxis* alone offers more for the health of the community than the judicious scientific employment of these measures. Realizing this truth, it is a duty to humanity, that every one who knows should employ every energy in his power to disseminate the knowledge to the fellows of the profession. Their great value is demonstrated, but we discern from clinical results that there are still many effects obtained, the *rationale* of which is yet to be explained, as the lowering of high arterial tension with the high frequency currents or the action of light upon metabolism. Such problems call for investigating research, and will eventually be solved.

In general, the principles of therapeutics demand the removal of every object or organism foreign to the body and the repair and restoration of each organic function, together with the systematic regulation of habit, diet, and environment. Under this broad conception one cannot fail to recognize the indication for a natural influence to restore natural physical function, particularly the employment of heat, light, electricity, together with the regulation of habit, diet, and exercise.

The knowledge necessary for the regulation of dosage and technique demands a studious investigation of facts and principles and proper administrations to meet the requirements of varying conditions. A novice may be fairly successful with a limited knowledge in simple cases, but results will evidence the technical skill or ignorance of the operator in difficult ones. A haphazard employment of physical measures will not succeed more than in surgery, requiring often as great skill in technique as the most difficult surgical operations and greater tact in the management of the patient. As great or greater skill in diagnosis is essential to effect a cure with these measures as with surgery—success or failure depending upon the personal equation.

The study of physical therapeutics and their relations to the human body is a study of the expenditure of different forms of kinetic and chemical energy upon the tissues and the transmission or induction in the body of the proper kind of action or exertion of the form of energy which shall induce in the

tissues of the body normal physical functions. A broad conception of energy and the different forms of energy in producing kinetic and chemical energy demands preliminary consideration in the study and application of physical therapeutics.

Energy and energy's laws.—"Half the greatest value to which the sum of the masses of all the particles of a given system, each multiplied by the square of its velocity, could attain except for friction, viscosity, and other forces dependent on the velocities of the particles; otherwise, the amount of work which a given system could perform were it not for resistance dependent on the velocities," is the law according to Sir William Thomson.

"This law applies solely to forces dependent alone on the relative positions of particles—that is, to attractions, repulsions, and their resultants. It is shown mathematically, that taking any two level or equipotential surfaces which a particle might traverse in its motion, the difference of the squares of its velocity as it passed through them would be the same, no matter from what point of space it started, nor what might be the direction and velocity of its initial motion. Thus the square of the velocity at any instant could be deduced from that at any other by simply adding or subtracting a quantity dependent merely on the positions at these instants. In like manner if a number of particles were moving about, subject to mutual attractions and repulsions, it is shown in dynamics that if to the sum of the masses, each multiplied by the square of its velocity, be added a certain quantity dependent only on the positions of the particles at that instant, this last sum would remain constant throughout the motion. Of these quantities half the mass of a particle into the square of its velocity is termed its *actual energy*, or *energy of motion*—that is, its kinetic activity; while the quality to be added to the sum of the actual energy in order to obtain a constant sum, is termed the *potential energy*,—that is, the latent or slumbering activity, or *energy of position*; the constant sum being termed the *total energy*. The corresponding general principle of physics is that the total energy of the physical universe is constant; this is the principle of the *persistence* or *conservation of energy*."

"*The law of the conservation of energy or of force*, the law that, fundamentally speaking, there are no forces in nature to which the law of energy does not apply; the principle that the total energy of the universe is constant, no energy being created or destroyed in any of the processes of nature, every gain or loss in one form of energy corresponding precisely to a loss or gain in some other form or forms. This is the great

fundamental principle of modern physics; it was perhaps first enunciated by K. F. Mohr, in 1837, though several physicists were independently led to its discovery. Those uniformities of nature which present phenomena of irreversible actions—such as friction and other resistances, the conduction of heat and the phenomena of the second law of thermodynamics in general, chemical reactions, the growth and development of organic forms, etc.—cannot, according to this doctrine, result from the laws of force alone, but are to be accounted as statistical uniformities, due to vast numbers of fortuitously moving molecules."

The human body is constituted of a variety of organic and inorganic chemical elements, each representing a form of energy in motion capable of performing the requisite functions for maintaining the respective parts of the human economy in a state of health, requiring, for the maintenance of normal conditions, a constant addition in the form of nutritive pabulum to replace the energy exhausted. The expenditure of tissue energy results in the destruction or impairment of the active parts, leaving within the tissues, both a need of repair and the elimination of waste products.

When we realize that disease occurs from an abnormal arrangement or condition of the factors which constitute an essential force necessary to the maintenance of normal relations, it is apparent that it will require for the restoration to normal, an institution of activity either from extrinsic or intrinsic sources which will restore the function of the part, together with the addition of proper energetic nutrient material which will replace or supply the demands of the tissues—functional activity and energetic food for the tissues are the indicated demand for either the restoration or preservation of health.

It must be readily appreciated that any agency that will restore a normal process without other addition to the tissues than the proper nutritive pabulum, must best conserve the purpose.

If from any cause the body is impaired, the addition is necessary of elements for tissue building, relative to the demand upon the tissues for energy expended, for the proper heat production, exercise, and functional utility of the organism; then health is maintained.

The indication for therapeutic intervention only occurs when from extrinsic causes or the inception of improper food, or irregular habits of life, abnormalities are induced. It is apparent that under these conditions, means employed to restore the tissues to normal, should do so by replacing the energy lost and re-establishing normal activity in the affected parts. When this is accomplished without addition to the economy

of any element not a component part of the organism, the minimum of disturbance is exerted.

When drugs or agencies which do not constitute a part of the body are allowed to act upon tissues, effects are liable to occur, derived from by-products or the presence in the body of substances foreign to it, the elimination of which exerts a labor upon the energies, abnormal to the functions of the organism, with a tendency to derange or impair the functions thus taxed. While in most cases it may not be possible to trace these effects, it is patent that they exist. If the tissues are constantly taxed by the passage through the body of foreign agents, results may occur, without evidence, for a long time, exerting injurious influences; and there is abundant proof that under this sort of therapeutic administration pronounced deleterious results *do* occur.

For the above reason when normal processes can be re-established without the employment of other than physical agents, and the necessary normal food pabulum, no possible injurious effects will result, and it is possible to establish them in most functional conditions by the use of such agents.

The complexity of the human organism and the exercise of the various parts in the intricate workings of the processes of life, comprise tissue responses and rates of vibratory impulse peculiar to the respective functions and activities, and varying to such a large degree that no one sort or quality of applied impulse will set up or restore all normal rates of tissue vibration, rendering it capable of meeting all therapeutic demands. For example: the normal respiratory impulse of 18 per minute, the cardiac impulse of 80, and the peristaltic movement of about 8 per minute, and the various finer vibratory actions associated with nerve impulses, heat production, and the numerous other varied conditions which constitute the working forces of the human economy, require the induction of varied vibratory rates to meet the different therapeutic indications.

Those who would undertake to employ light, mechanical vibration, electricity or heat applications, one only for the treatment of various diseased conditions, would utterly fail in any except the conditions to which they are respectively adapted.

The knowledge of how and what to do with physical measures must include the knowledge of the effects of the various agents upon human tissue and their capability when scientifically employed to meet therapeutic indications.

It will not, however, be possible at this time or probably at any future day, to determine with exactness, the definite rhythm or vibratory wave motion or impulse which will be attuned to the workings of one or any of the organic functions of the body; nor is it necessary that the vibrations shall be attuned, except approximately, to a relative rate of tissue vibration.

Individuals vary in their characteristics of intensity and re-

sistance as indicated by differences in physical constitution and functional capacities, making impossible the adoption of any definite rate or intensity that will be applicable to all mankind.

The study of the employment of the physical measures therefore involves a familiarity with the peculiar qualities and various actions and indications for the employment of all the agents which induce physical effects capable of influencing the re-establishment of normal processes and the removal or correction of pathological conditions.

[W. B. S.]

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

DR. GRANGER'S SLIDING FLUOROSCOPIC FRAME.

The main frame (4) slides on tracks (7 and 8) in a horizontal direction, giving a lateral motion to the x-ray tube.

The small frame (2) slides in a vertical direction between the uprights of the larger frame (4), giving a vertical movement to the x-ray tube. This movement is obtained by pulling on the rope, of which the counterweight (3) for the small frame (2) is a part.

The fluorescent screen (1) is protected by lead glass on the side facing the operator, and being freely suspended and counter-balanced by the weights in boxes (C) is freely movable in any direction.

An operating table such as is used for x-ray work can be placed so that extension on (6) will move under the table and main frame (4) be on the coil side and continuous rope, with counterweight (3) on the operator's side.

To make a fluoroscopic examination the frame is easily made to slide in the desired position over any part of the table. The screen (1) can be pulled down to any desired height and the vertical movement of the x-ray tube is controlled by continuous rope (3) at the operator's hand, without having to reach to the side or behind the patient. When not in use and the table is required for some other work, the whole frame is easily made to slide on its track towards either end of the table, where it will be most out of the way. The reason for using only one lower extension (6) was to allow a greater range of motion under the table and between its legs.

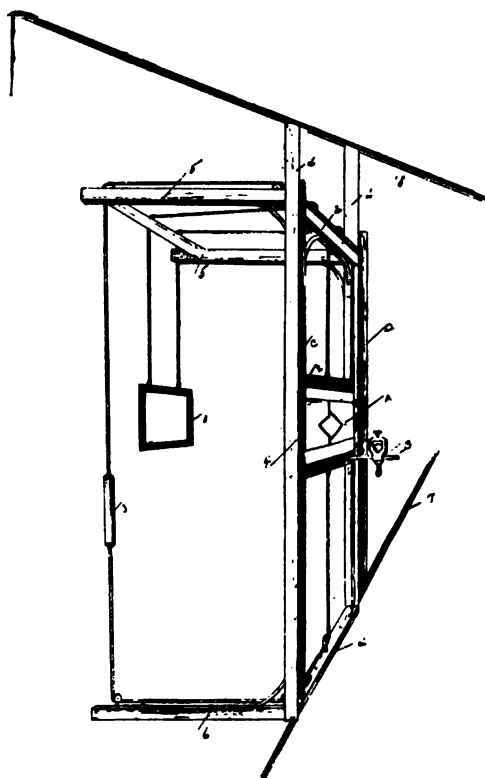
We claim the following points for the frame:

1. That it is a convenient and practical arrangement whereby all the accessories necessary for fluoroscopic examination are

held on one frame, which can be easily brought into use or as easily moved out of the way.

2. This frame can be easily adapted to any sized office or any make of x-ray table.

3. It takes up practically no space, is not cumbersome, can be made very light, and its movement (that of a sliding door) is free and easy.



1. Fluorescent screen; 2. Small sliding frame, containing tube-holder (B) and lead diaphragm (A); 3. Part of continuous chain and counter-weight for (2) small sliding frame, etc.; 4. Main sliding frame moving on tracks (7 and 8); 5. Overhead extension supporting pulleys for continuous chain arrangement (3) and also for ropes for screen (1); 6. Floor extension; 7. Track on floor; 8. Track on ceiling; C. Boxes in which counterweights for screen (1) slide.

4. Two movements can be imparted to the x-ray tube, one lateral, by sliding the whole frame; another vertical, by moving the smaller frame (2), by means of the continuous cord and counterweights (3). This latter movement, though more important by far, is obtainable without reaching either to the side or behind the patient.

5. The screen is suspended freely in front of the patient and can be easily placed in any desired position.

The Journal of **Advanced Therapeutics**

VOL. XXVI.

FEBRUARY, 1908.

No. 2.

WHAT IS PAIN? *

AN ATTEMPT TO DEFINE ITS ORIGIN AND NATURE.

BY F. HOWARD HUMPHRIS, M. D. BRUX., F. R. C. P. EDIN.
HONOLULU, H. I.

In this paper I venture to put forth a definition of pain and to find an origin common to all varieties, and to ascertain in some manner the nature of pain. Of course, until we have instruments of greater precision, deduction alone is left to us to approximate certain facts, and the only way to arrive at a knowledge as to the nature of pain is to try and seek that path along which the cause itself has traveled to produce the pain, and also to try and find out in what manner the means and measures used to relieve the pain effect their object.

One thing stands out pre-eminent, if not alone, as a producer of pain, and that is pressure; I doubt if we are going too far, if we declare that pain is pressure. In most cases if we relieve the pressure we relieve the pain, and in those cases, if there be any, in which we have pain and after removing the pressure, I think that there, although we may have removed the pressure, we have not removed the effects produced by the pressure; a matter into which I will go more deeply later.

We all know that some pressure will cause some pain, e. g., the pain from abscess, from ingrowing toenail, from cancer, from congestive headache. We will endeavor to show, indeed, that all pain can be traced to some kind of pressure. It might seem at first sight difficult to connect the familiar pain in the shoulder with the liver—or the pain of the knee joint in hysteria with pressure, but the connection, I think, is so clearly expressed in John Hilton's lectures that from them I propose to quote the explanation.

He states that sympathetic pain between the shoulder or over

* Read on September 18, 1907, before the American Electro-Therapeutic Association at Boston, Mass.

the inferior angles of the scapulæ is one of the most frequent and he shows that it must be connected with the distribution of some of the spinal nerves, because no other structures could express the pain. No other nerves occupy that position, except the 4th, 5th, and 6th dorsal nerves, which are distributed over the inferior angles of the scapulæ and interscapular space. Hence we must conclude that these nerves are the immediate seat of pain. If we trace internally the great splanchnic nerve from within the thorax downwards, we find it connected at its terminal with the solar plexus, thence we trace its distribution to the stomach, duodenum, liver, and pancreas, and if we follow the other and upper end of the same great splanchnic upwards to the 4th, 5th, and 6th, which give peripheral sensitive filaments, over the angles of the scapulæ, to the interscapular spaces, and the adjoining skin, one can well imagine that these nerves carrying the influence upwards and backwards may explain the occurrence of the pain sometimes experienced in those external parts associated with abdominal and visceral disturbances—i. e., pressure.

In brief, we have the great splanchnic nerve communicating with the solar plexus and thence to liver and other organs of digestion on the one hand; and distributing branches to 4th, 5th, and 6th dorsal on the other.

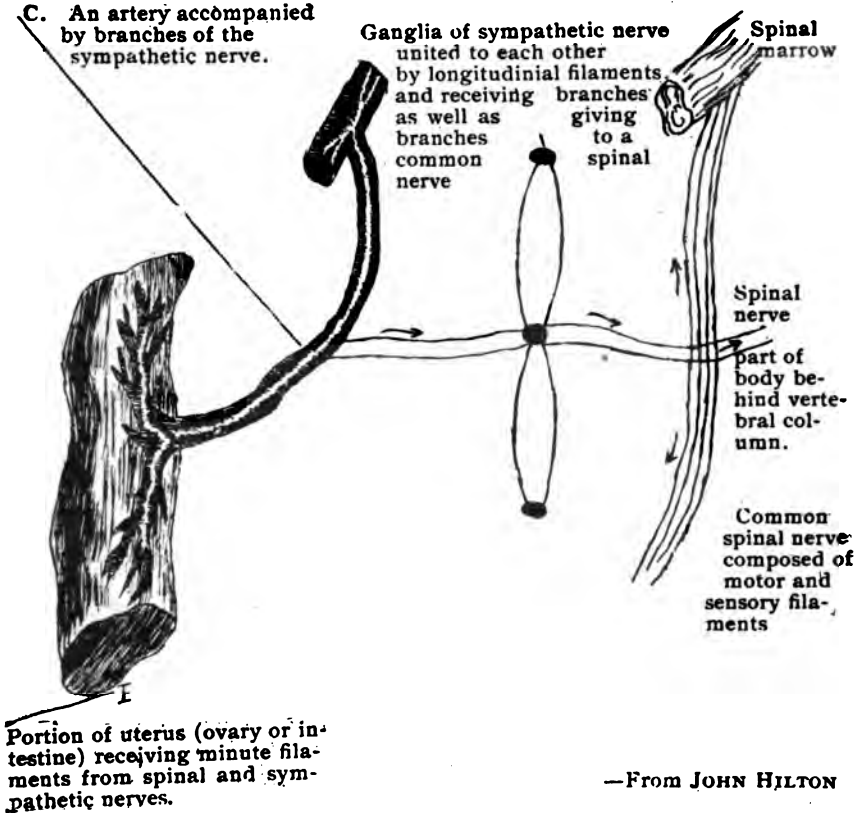
If pain is felt on the surface of the body it must be expressed by the nerve which resides there—no other structure can express pain. Therefore somewhere along the course of that nerve—if we carefully trace it—we shall surely find the cause of the pain—i. e., the pressure.

Hence also in spinal disease, pain is often first mentioned not in the spine, the seat of the disease, but at the cutaneous extremity of nerves issuing from that part of the spine actually diseased. The commonest form of this is in the hip joint disease where the pain is usually within the knee or on the inner side of that joint, and we know that it is caused by inflammation or pressure of the ligamentum teres and that the obturator nerve sends a branch to it as well as to the interior of the knee joint and to its inner side.

Explanation of hysterical pain in hip and knee joint in brief is that the sacral ganglia and lower lumbar ganglia of the sympathetic are connected with the great sciatic and partly with the obturator. These same ganglia are likewise connected

with the nerves proceeding through the broad ligament to the uterus and ovaries. See diagram.

The arrows indicate the directions along which any pressure of uterus (ovary or intestine) might exert its influence, i. e., backwards towards the posterior part of body behind vertebral column or up into the marrow and thence down in the common spinal nerve to its muscular, articular, or cutaneous distribution. Hence the common backache of menstruation—



of ovarian and uterine trouble—and the explanation of hip and knee pains in hysteria.

Hilton reports two cases of exostoses on first rib pressing on ulnar nerve and resulting in pain and gangrene of 4th and 5th fingers.

There are many other pains which may be traced to pressure

if we study them sufficiently,—headache, toothache, and the pains associated with malaria. This last perhaps requires a special word of explanation. We know that a mild stimulation causes a cell to swell and I suggest the malarial poison acts as this stimulant, and with the swelling of a multitude of cells we get pressure and the resultant pain.

Nature herself always endeavors to prevent nerves being subject to undue pressure—for as a rule they enter muscles where they would be most secure from pressure.

So much for pressure as a primary cause of pain, and under the term pressure I would include stasis.

I have already shown that peripheral pain is frequently the result of some central pressure or stasis, for where pressure is exerted, stasis more or less complete must be induced. Therefore while we can hardly call pressure and stasis interchangeable terms, yet as factors in the causation of pain they may be used as such.

The next step in the causation of pain is that the pressure causes an altered vibration of the nerves. It is known that our nerves are in a state of vibration. It is evident that pressure will alter normal vibration and may cause a readjustment of the elements. The probability is that almost every nerve and perhaps different parts of each nerve vibrate with varying degrees of vibrations, inasmuch as they vary in length, weight and tension, and the law of vibration of strings may be held to apply to nerves.*

All our physical sensibilities are due to an altering of our normal vibration (touch, pressure as in walking) or to different rates of vibration from without (e. g., sound, heat, light).

Sound means a vibration of less than 36,000 per second, 18,000,000 means heat, 462,000,000,000 produce a sensation of light, and with the increase of vibrations, color after color is recognized until with vibrations of 733,000,000,000 violet appears, vibrations of a higher rate than this we cannot appreciate. The x-ray we know exists but we cannot describe it in terms of sensation of even greater intensity and more frequency. And are the etheric vibrations given off by radium and radio-

* The vibration frequency of strings of the same material varies inversely as their lengths and the square root of their weights and directly as the square roots of their tensions.

active substances which are classified with regard to their rate of vibration. It is not difficult to imagine an animal more highly specialized than we are to have double the number of senses with which we are endowed, say a man from Mars, who might come to visit us, who would be able to transfer his thought from place to place, to have a sense of intuition absolutely accurate, i. e., being capable of noticing more rapid vibrations than we ourselves can.

The word vibration means "a recurrent change of position." Gage says, "When a vibratile body is compelled to surrender its own vibration period and to vibrate in an arbitrary manner imposed on it by another, the phenomenon is known as forced vibrations." Now there is always a tendency in nature to return to the normal from the abnormal, as also a tendency to continue in the abnormal, for instance in riding a horse, the animal may get into an uncomfortable trot, and if not checked has a tendency to keep in that trot, whereas if the rider put the horse into a new step altogether, say a canter, then on returning to the trot the tendency will be to return to the normal trot to which he has always been accustomed rather than to the abnormal trot which he had just taken up—so, a nerve may get into a state of abnormal vibration, through pressure, let us say, if we can, by massage, electricity, or vibration impose on that nerve, forced vibration, the tendency will be for that nerve when the period of forced vibrations be ended, to return to its own normal vibration rather than the abnormal and painful vibration.

I have perhaps strayed from the strict path of the subject of my paper while on the subject of vibration, but enough could be gathered by analogy to show that vibrations of our nerves exist, and as I said before it is evident that pressure would influence these vibrations.

I now wish to point and trace out the similarity between our nerve force and electricity. Ever since Galvani, nearly 150 years ago, separated the sciatic nerve from its lumbar attachment, and by means of a glass rod applied the cut end of the nerve to the exposed gastrocnemius of the frog and found that the muscle contracted, animal electricity has been an accepted fact. It is needless to discuss the analogy between the electric phenomena produced by electric fishes and the currents produced by the human tissues, for it is admitted now that all

tissues of living organism are capable of producing electric currents, a multitude of books have been written and experiments made from the end of the 18th century down to the present time. Whether or not there exist the two currents, the one of rest and the other of nutrition, or only one, it is not necessary for the purposes of this paper to go into. One analogy perhaps should be mentioned and that is, that when the nerve supplying the muscle is cut, that muscle no longer contracts. But when an electrical stimulus is applied, the muscle does contract, the nerve and the electric current both giving the same result. Again Helmholtz has shown that "electric and nervous currents obey the same laws." *

Rays similar to the x-rays are given from the human body during muscular and nervous excitement and by compression of nerves.

If the constant current be applied to the cheek we get a sensation of taste, if the same current be applied to the forehead the sensation of light is produced, if to the ears sound is heard.

The connection between nerve force and electricity is well set forth in the *Journal A. M. A.*, March 7, 1903. O'Brien says, "I picture the nervous system and its mechanism in living action before my mind, I see beside it the central telegraph system of New York or London, with its radii of lines and cables, telephonic and telegraphic, its multiple switches, batteries, relays, transformers, condensers, shunts, duplex and automatic circuits, all this mechanism, like the nervous system, transmitting force and transmitting intelligence from point to point by terminal instruments which move, talk, print, light, inhibit, accelerate and regulate and in one hundred ways doing what is done in the nervous system, and always by means of the same force—the only form of force capable of such vast and varied service."

Abrams says: "Artificial electric stimulation of nerve fibres corresponds most nearly to their natural excitation, and we therefore assume in our present state of knowledge that nerve force and electricity are identical."

* Humbolt, 1799; 1827, Nobili; Matteucci, "The Phenomena of Electro-Physiology," 1844; Dubois-Raymond, "The Electro-Physiology of Motor Nerves and Muscles," also Eckhard, Pflüger, Baierlacher, Erdman, Erb, Beard and Rockwell, whose especial study was the Great Sympathetic.

If this be granted, and our nerves (be it nerves, and their atomic elements, their ions or what not) be in a continual state of vibration, then may it not be that the vibration rate being altered, that their electrical conductivity, or resistance is likewise altered, causing the electricity to flow in a different manner, and that this altered resistance is manifest to us as pain and that pain is altered electrical resistance. But before formulating this theory let us look at the way in which agents to relieve pain act.

Whether we take away the pain with opium and its derivatives, the coal-tar analgesics, electricity, massage, heat, light, counter irritation or operation, there is one effect common to almost all, namely, the relief of pressure. The one thing common to all pain relieving agents is the withdrawal of pressure from the affected part; the next thing that they do either directly or indirectly is, to induce a different vibration in the offending nerve, either directly as by electricity or vibration, or indirectly as by drugs or counter irritation by withdrawing the pressure a different rate of vibration is set up, for it is impossible to imagine anything which was vibrating under pressure at one rate of vibration to go on vibrating at the same rate when the pressure is removed, and with the normal rate of vibration re-established the normal electrical resistance returns and the pain is no more manifest.

To see that these agents do act in this manner and primarily relieve pressure, let us take them up individually. If we begin with morphia we are met with the clear statement of the leading authorities that the cause of the action of morphia on the central nervous system is very imperfectly understood. We know that morphia dilates the cutaneous vessels and it is evident that this in itself would tend to relieve congestion, i. e., pressure, and this might account for some cases in which pain is relieved, but I am inclined to think that in the majority of cases, it acts through the centers, and I suggest that it is on account of its depressant action on the nerve centers that it relieves pain. By its depressant action on the nerve centers, it modifies vibrations in the nerves, relieves pressure, and thus restores normal electrical resistance, and if morphia and other analgesics may give relief from pain by modifying the vibrations in the nerves, it may be that one can acquire the power to control voluntarily these vibrations, so that if the nerves are in

a state of abnormal vibration which is evidenced as pain, the person who has acquired such power would suffer no pain. On this hypothesis, the relief of pressure is the relief of pain, we can easily understand why counter irritants such as mustard plasters, blistering, etc., relieve pain.

Why, too, electric light baths, which cause the capillaries to fill, (and these capillaries it is computed can contain two thirds of the total blood of the body) and the deeper vessels for the time to be so depleted by thus withdrawing blood where the congestion (or pressure) is giving rise to the pain—should thereby relieve that pain.

It is interesting here to inquire how does the x-ray relieve pain? By relieving pressure. Among the various hypotheses, explanations which have been advanced as to the manner in which this potent remedy acts are:

1. The neurones are stimulated; this resulting in lessening metabolism and diminishing blood supply owing to contraction of the cells comprising the arterial wall.

2. The muscular fibers themselves are stimulated to contraction. This would certainly account for most of the results of the x-ray, but it is difficult to explain why these rays should select either the neurones of the motor system or muscular fibers.

3. More probable is it that the cell protoplasm is stimulated to contraction which suspends activity in degrees varying with the amount of radiance, but the point I wish to make is that to whichever hypothesis we pin our faith, the one point common to all these is contraction, and with contraction comes relief from pressure, and hence relief from pain. I have seen a patient with a large facial epithelioma come into the room, eyes full of tears with the pain with which the non-diseased part of her face was contorted. After a few minutes' exposure to the x-ray the pain contracted muscles relaxed, and at the end of the exposure the patient was free from pain. What had happened? Superficially we could see that the surface instead of being moist and discharging was dry and glazed as though painted with collodion, i. e., the cell protoplasm had contracted, relieved the pressure and, *pari passu*, relieved the pain.

The explanation of the way in which static electrical currents in their wellnigh miraculous way relieve pain is similar.

As Dr. Snow says, "nothing so thoroughly overcomes the area of congestion as the static high potential modalities."

We can in some instances by applying electricity to the surface where the pain is described, relieve that pain, although caused by pressure in different parts along the course of the nerve, thus reaching by means of the centripetal neurone the suffering cortical center or the point to which the pathological pressure is being applied. Having already shown that electric and nervous currents obey the same laws it would seem that electrical treatment with its power of remedying stasis, restoring good conductivity, would be the most reasonable treatment in cases where the nerve is suffering.

I think I have said enough to show that remedies which relieve pain, relieve pressure, and though this is not logical and absolute proof that pressure is the primal cause of pain, I think that it is as near a proof as our present state of knowledge will allow us to go. One point more before I come to the concluding argument perhaps should be made. That is on the point as to why having admitted, or proved that the electrical resistance is altered in nerves, I should claim an altered sensation.

If, as we have shown, pressure causes a readjustment of the nerve elements it is not difficult to understand that this readjustment should cause altered electric resistance, when we compare certain known substances with our nerves as conductors of electricity. We know that substances can be of the same chemical composition and yet have entirely distinct qualities (allotropism, c. f. the familiar example of carbon and diamond). Similarly if we use a copper wire for some length of time for the passage of electricity, it sometimes undergoes change, some ionic modification, and becomes brittle; so, too, the filament in an incandescent lamp, after it has seen much service, is still a carbon filament in its comparative vacuum, it has undergone some allotropic modification and does not burn so brightly and it uses up a greater current. So it is with our nerves, pressure causes a temporary allotropism and pain may be defined as a temporary allotropism of the nerves caused by pressure, such allotropism causing an altered electrical resistance and this brings us to the known law of electricity, "electrical currents travel differently in different resistances," and this difference we feel as pain.

As we have already seen when pressure is exerted upon a nerve it does not follow that the patient refers the pain to the point of the application of the pressure. He may refer it to some point on the nerve far distant from the pressure point, as for instance the terminal endings of the nerve near, or in a joint, or over the skin, and this, I think, accords with the theory I am endeavoring to show and may be thus explained. There is no doubt but that the vibrations are primarily distributed at the point of pressure, and hence electrical conductivity altered. But, take the case quoted, of the exostosis of the first rib pressure on the ulnar nerve, in which there were so many fibers at the point of pressure that the normal electric current could pass so as not to give rise to pain at that point, not so however when the interference (and consequent alteration of vibration) reaches the finer filaments of the nerve, for here the nerve has not bulk enough to allow the normal electric current to pass in its normal manner and therefore manifests the altered resistance by pain. It may be that when a nerve is pressed upon, only some of its fibers or some of its molecular constituents have their vibration rate changed, and these not in a manner sufficiently strong to alter the normal vibration of their neighbors who would carry the current in a normal way, but when this nerve becomes attenuated and the fibers are few and thin, then we have pain in the peripheral or terminal filaments.

RECAPITULATION OR SUMMARY.

1. All pain can be traced to pressure even as all pain relieving agents tend to relieve pressure.
2. Our nerves are in a constant state of vibration, pressure alters the normal rate of vibration.
3. Our nerves are conductors of electric currents.
4. With the altered vibration rate due to the pressure there is an altered electrical resistance.
5. In the altered electrical resistance, the currents pass differently.
6. This difference is pain.

From which we may conclude that adequate pressure, by interfering with the normal vibrations of the nerve elements causes altered electrical resistance in them. This is pain, or, to put it more briefly and in more direct reply to the title of this paper, pain is the subjective manifestation of altered electric resistance in a nerve, primarily caused by pressure.

Discussion.

Dr. Snow: Personally, I want to thank Dr. Humphris for his excellent paper. It is a view that I have long had in my own mind, though I am certain that I could not have expressed it as clearly as he has.

In our investigations of painful conditions, if we can locate the causes of pain, we can generally relieve them by relieving pressure. By the application of various harmonic vibrations we may be able to restore the normal nerve vibration and relieve the symptoms of pain; but unless we relieve the pressure and condition that has destroyed the normal vibration, the pain will recur. When the pressure is relieved, however, the normal vibration of the nerve is restored and a cure effected. That the presence of pain is due to the pressure of local stasis, and congestions, is well illustrated in cases of sciatica, in which the location of the pain is usually remote from the lesion, but the treatment of the pain, without giving attention to the lesion, is futile. First relieve the congestion and pressure and, without farther treatment, the remote pains will disappear.

Dr. Waite: I have listened to this paper with a great deal of interest. It is my opinion that when we find the vibration that will relieve pain we shall accomplish much and get excellent results.

Dr. Massey: I also feel that we have had a very interesting, clean-cut paper. Facts have been brought together and marshaled, and many things have been made clear, though possibly a little later someone will say the doctor did not discover anything new. My reply is that a new value has been given to old facts by proper generalization, even though the facts were already known. The last speaker suggested certain thoughts that would establish the possibility of some method of objective measurement of all pain. This certainly would be a very desirable thing. Another thought is the rather singular neglect of electro-diagnosis in electro-therapeutic literature of late. This subject is simple enough when properly understood, and should render the members of this Association of much value to the courts in elucidating the truth in medico-legal actions for injuries involving the motor apparatus.

Dr. Brockbank: I have listened to the doctor's paper with a great deal of interest, and I am sure it is manifest to the mind of every worker in physio-therapeutics that pressure is a great cause of pain. We see it manifested every day. Take a patient who complains of many painful conditions and painful manifestations, it seems difficult to determine the cause. You find on examination of the pelvic organs a little scar tissue as a result of slight laceration of the cervix. You hesitate to base your opinion at that time on that condition being the cause, yet you find no other apparent cause. The most careful examination you can make may convince you that it is

liable to be the cause, and on the removal of that condition either electrically or surgically you relieve those distressing symptoms and cure the case. I mentioned a case last year which I think will bear repetition. It was a case, a very aggravated case of dysmenorrhea; the young woman, of about twenty-six, consulted me for refraction. I made a refraction as far as possible to benefit her condition and advised an operation for the muscular condition, convergent squint of 40°, which she refused and subsequently consented to. I was not aware at that time that she suffered from any reflex symptoms. The first operation was in March 1897 and the other one in June. I had heard no more about the case and nothing was said to me about it until about a year after when she came to the office to have her eyes examined. She stated that if she had obtained no relief from the eye condition she had received sufficient benefit in other ways to pay for all she had endured. She related she menstruated at sixteen and she was then twenty-six and had never had a painless menstruation. Since her operation for the eye trouble she had no further trouble, which shows a marked sympathetic condition. It is well for us to realize that very small troubles, apparently, will produce very large reflex troubles, and a pressure may be found somewhere along the nerve trunks or in the spinal centers.

I think the doctor's paper has centered our attention on some old facts that have been possibly known in some sort of a way but never very carefully utilized in our daily practice.

Dr. Bishop: I wish to personally thank Dr. Humphris for this valuable paper. It shows a wonderful amount of electrophysiological research and is very much in harmony with a paper that I had the pleasure of reading last June before the New England Electro-Therapeutic Association. Many of his experiences and results are similar to mine. He has particularly well expressed some of my views on the physiological laws as laid down. A point of special interest it seems to me, and one that special stress was laid upon in my paper, was that electricity exercises its influence upon the human body directly by its action upon protoplasm. Therefore, we can readily see that nerve cells, muscle cells, and in fact all protoplasmic masses (this of course includes all the organs of the body), are amenable to the influence of electricity. It is a well-established physiological law that electricity in weak currents will stimulate protoplasmic cells and cause them to swell, while strong currents will diminish their irritability and if too long continued will cause them to shrivel and decay. Kirk says that pain is an evidence of a metabolic change in the nerve centers of the brain. This, perhaps, is a catabolic change and is due to an increased irritability in the center; therefore, when we relieve pain by the aid of electricity we have probably done

so by producing an inhibitory action upon the sensory centers in the brain.

Pressure, as the doctor has stated, causes pain. I am not prepared to state that pressure always causes pain. Light pressure upon a sensory nerve if continued will cause pain, or perhaps a reflex motor action. Stronger pressure will cause more pain, and very strong pressure will cause loss of sensation upon a motor nerve. Light pressure may also cause spasmodic action. If the pressure is strong enough to cut off communication with the spinal cord, flaccid paralysis results. If the pressure is in the cortex of the brain, spasm of the muscles supplied by the region pressed upon usually follows. If it be below the cortex, paralysis of a spastic nature occurs.

I firmly believe that nerve currents and muscle currents are true electrical currents. In fact, it has been positively proven to be so, by very carefully conducted physiological experiments. It has also been proven that electrical currents running in the direction of the natural nerve currents will intensify the strength of the nerve current and the irritability of the nerve. That an electrical current running in the nerve opposite or against that of the normal nerve current will diminish the irritability of the nerve.

These are very important facts, for they lay a solid physiological foundation for the treatment of disease by electricity. The doctor states that morphia relieves pain by removing pressure. This may or may not be true; personally I do not believe it is. I believe that morphia acts by obtunding the sensibility of the nerve centers and that the effect is toxic. For when the effects of the morphia ceases, the pain usually comes back and often with renewed energy. We should, as scientists, study the effects of our various currents upon the sensory nerves, since it is very much to be desired that we have a formula (an objective formula) as complete and as reliable for the sensory as for the motor nerves. I do not believe we fully realize the importance of our motor nerve formula from a medico-legal standpoint. Two years ago I was requested to visit and examine a young man who had been injured by one of the railroads four years previously. The man was a confirmed invalid and had been confined to his bed for years. The surgeons for the company and the company's lawyers had been led to believe that the man was a malingerer, and I believe had pretty well convinced the courts to this effect. My examination showed a paralysis of degeneration of most of the anterior group of muscles and some of the posterior group of the lower extremities. When this objective examination and its results were explained to the jury and judge, the case was tried and resulted in a disagreement. The case came up again last spring and the young man was awarded seventeen thousand five hundred dollars.

I think Dr. Humphris has done the society a favor in bringing this paper before it.

Dr. Brinkmann: The writer of this paper is to be commended for having the proper scientific spirit. I agree in the main with the writer of this paper. You will remember in all of the old great works, on electro-physiology, the original works, the discussion between Duchenne and his German rival, Du Bois-Raymond, as to the nature of the currents which were carried along nerve trunks. At that time very delicate instruments were made and comparisons were instituted, one set showing the speed and other instruments to determine the nature of the current traveling along the nerve. I believe it was a question that was not decided. You will find among the older works, for instance the work of Morgan, a full description as to what was done experimentally. We know that in the telephone we have a series of waves that travel at the velocity of one hundred and ninety-two miles a second, and we know these waves carry with them the sound waves traveling more slowly, and those electrical waves are the means of carrying the slower waves to their destination. We also know in the application of multiplex telegraphy that four messages can be carried at the same time on the same circuit. We must not allow ourselves to reject what was done by these older men. We do know something is carried and we do know, as the writer has stated, that when there is pressure on the nerve centers it will produce pain. That is absolute. I do not think there will be any dispute about it. Assuming that the nerve trunks are carriers, we know by experiments and demonstrations that prove it every day that the capacity for conveyance of electrical current exists, where there is no conduction it does not flow. We know a sensation can be carried by an electrical current where the normal nerve is sensory and at rest, ordinarily it is not perceived, showing there is a carrying capacity in the electrical current which does not exist in the nerve current under the ordinary conditions.

The doctor said pressure is the cause of pain. Of this there can be no question, but it is not the only cause of pain.

Among the older works was made the statement that the longer the distance between which the electrodes were placed along the nerve trunk the more profound would be the effect; also that pain is referred to the end of the nerve. How are we to get at some of these cases we have? Stick your fingers in your patient. We are going to get a very valuable lesson, something we can talk about continually. I spoke in my address of the presence of the spasmodic muscle. You can never find out much until you know what the shape of the muscle is, what its normal conditions are, what it should be in a state of contraction, etc. When you remove the cause of the spasm in that muscle you will relieve the pain.

Dr. Brockbank: Dr. Brinkmann's summing up of the lessons we may take from this paper strikes a very receptive chord in my mind. He says, "Stick your finger in your patient." If you will begin to make a careful, complete minute examination of many patients who are constantly complaining about some pain they cannot seem to account for, you will be surprised. In my paper last year I tried to show the necessity of this careful examination and the great surprise that would await them. I have frequently had patients suffering from distressing conditions who complained of tiredness and feeling they were entirely worthless. I have asked then if they have suffered any pain again and again, and they reply they have no pain at all. I have that patient stripped, laid upon the table, and go over the back carefully, making pressures along the muscles of the back and over the spine, and this has been to the patient a remarkable surprise and a good deal of a surprise to me to find so many painful conditions where the patient did not complain of pain. The other surprise you will have will be the production of relief obtained by rational procedure. Relieve your painful conditions and you do more for him in a single treatment than drugs will do in six months. You will find by going carefully into the case that it is necessary to get at this systematically, thoroughly, and carefully; and when you do that and diagnose the condition fully, then know your modality and apply it correctly, then the time will come that we as physio-theraputists will prove to our people the virtue of the treatment and the good news will be carried abroad to others, so eventually a great amount of good will be done. Some men taking up this work think that we have a good easy thing—they seem to think the apparatus is the whole show. The sooner men who are taking up this class of work realize that they should give a careful, thorough, accurate examination, the sooner they will realize that the greatest part of their work is accomplished. The treatment is a very simple matter. The disease conditions in physical therapy are very simple, and it seems there should not be many mistakes made. There should be no guesswork about it. When you put into practice your treatment you want to know how it is going to act. We know it will do a certain thing, and when we have a condition and have the means and knowledge to apply that means then will we achieve success.

Dr. C. R. Dickson: I think the writer of this paper is doubly to be congratulated, not alone upon the intrinsic value of the paper itself, but also upon furnishing a paper that has called forth such an amount of excellent discussion. The discussion elicited is often the most useful thing about a paper, but in this case both paper and discussions are important. In listening to the discussion I sincerely hoped there were none of those awful osteopaths here, lest they should think we were con-

verted to their views. They are using, or rather abusing, this theory of spasmodic action. As I have said on several former occasions, it is a very poor handful of chaff that does not contain at least one grain of wheat. But the only true course is to discard all the chaff and find that one grain of wheat, and be ever ready to utilize that grain, instead of making an extra "pathy" out of every handful of chaff. There is a great deal to be said about this whole question, more than our limited time will permit, and I think this discussion has been very valuable. It gives us a new idea. There is no doubt about the relations between pain and spasmodic action, and we are here to try and ferret out these puzzling things and clear them up, and it looks as though we were going to have pretty fair success in our efforts.

Dr. Cleaves: I was unfortunate in not hearing the doctor's paper. The necessity for careful physical examination of patients not only commends itself, but careful clinical laboratory work as well is most essential. As physicians it is necessary that we should know the condition of the urine, blood, and discharges, and keep records of the same in order to intelligently care for the conditions we have to meet. When we do this we will secure better results and at the same time will be able to demonstrate the rationale of our therapeutic measures, whatever they may be.

Dr. Humphris: I wish to thank you very much for the reception accorded this paper. It is a little nervous work for me speaking in the presence of men who have taught me all I know about electricity. As to Dr. Massey's remarks, I think it may be possible some day to get an objective measurement of pain very much in the same way as they test for fault in a submarine cable, by sending a current and locating the fault by means of evidence of altered resistance. Dr. Bishop in his very flattering remarks pointed out what I see now is a weak point in the paper. In mentioning morphia for relief of pain does not mean the relief of pressure. I wish I had stopped before making that statement, but I do not think that weakens the theory. Although we have agents for relief of pain, most of them relieve pressure. Still we have things that do not relieve either. The pain exists, but we are not conscious of it. I am very much indebted to Dr. Snow. It was from him I got my first idea.



THE MECHANO-THERAPY OF AUTOINTOXICATION.*

BY FREDERICK H. MORSE, M. D., BOSTON, MASS.

The mechanical treatment of diseased or functionally disturbed organic conditions offers so great a field of observation, and such a chance for speculative theories, that from the point of view of well-established physical effects and carefully observed clinical results only, should we attempt to present the subject. At the present time much is being done by pathologists in the study of the origin of disease, rather than observations on the significance of symptoms and anatomical lesions. Autointoxication plays an important part in the etiology of a great number of affections that we, as physicians, are called upon to relieve.

In a way, it is generally understood that the nervous system is an important factor in the causation of disease, but the unlimited number of reflex symptoms—nerve reactions—so often divert the physician's attention from the real seat of the disturbance, that empirical symptomatic, unsatisfactory treatment is the result. The temporary relief which may possibly be accomplished by drugs for headache, insomnia, general debility, mental depression, disturbances of motor and sensory functions, have, as a rule, a deleterious effect upon a patient; further confirming the already partly established belief that they must take medicine for every symptom.

The human organism, according to Bouchard, in its normal, as well as its pathological state, is a receptacle and laboratory of poisons. Among these some are furnished by the organism itself—microbes which are either the normal inhabitants of the intestinal canal, or parasites at second hand and disease producing. But the peculiar functions of the excreting glands usually correct both by physiological and chemical action and prevent trouble. However, when an unusual amount of toxins are present in the digestive tract, so that the normal vitality is lowered and the resistance diminished, we have a condition in which the parenchyma of the different tissues or organs is in-

* Read at the Second International Congress of Physio-Therapy at Rome, Italy, October 15, 1907.

fect, and thus normal functions are perverted. Then the usual medication does not avail.

The dilated stomach, the distended duodenum and other parts of the intestinal tract arise from an existing or pre-existing catarrh of the parts, causing more or less paresis due to an overstretching of their circular muscles.

There is a constant tendency to toxemia from accumulation of waste products in the alimentary tract, but so long as the emunctory offices functionate normally, there is little need of interference, but toxins caught in the meshes of these organs may cause intoxication more or less rapidly and then a change of local nutrition takes place. Unfortunately, the physician is, as a rule, not called to these cases until secondary symptoms have developed, and while intestinal antiseptic and dietetic treatment and removal of all causes are strongly indicated, there is still more to be done for repair of the damage to the nervous system. The elimination of the aforesaid toxins must be brought about by stimulating the functions of the lymphatics and other glands, whose business it is to do that work. As functional activity depends upon the condition of the nerve supplying the corresponding part from its spinal origin, the solution becomes, to a certain extent, simplified.

The adoption of physical methods in the treatment of inflammatory exudates, whether from serous or mucous membrane, or in joint affections or their general effects on the circulatory and muscular systems is not new. The object of this paper is to suggest means by which to eliminate the toxins and other products of autointoxication more especially from the digestive system, which may be brought about by physical methods.

A proper appreciation of the nerve supply to the abdominal viscera must be in mind before one can intelligently use physical therapeutic methods. Physical treatment, employing mechanical vibration, some of the electrical modalities, and massage, are capable of producing a variety of indicated effects. They increase the flow of blood and lymph to and from a given area or organ, thereby stimulating secretion and excretion, encouraging muscular and general metabolism, and relieving tissue congestion, muscular rigidity and pain. According to the classification given in Dr. Arnold Snow's excellent work on the subject, mechanical vibratory effects may be (1)

Mechanical, inducing the removal of extravasations, lymph, exudations, transudations, breaks up adhesion, etc., etc. (2) *Chemical*, assisting in the interchange of oxygen, etc., etc. (3) *Thermal*, increasing heat elimination and with deep vibration acting on muscles, heat productive, etc., etc. (4) *Physical*, assisting endosmosis of the lymphatics and the physical action of respiration. (5) *Metabolic*, inducing anabolic and katabolic changes affecting the functional activity of the part as in the removal of stasis and an increase in the nutrition of a poorly nourished muscle. (6) *Reflex*, in inducing activities and changes in related parts through the nerve stimulation of the central and peripheral parts of the cerebro-spinal and sympathetic system.

The effect of the stimulation of the splanchnics increasing peristalsis, is according to physiology: "If the blood supply is normal, it slows or prevents them; if abnormal, it increases them"; these principles must be observed in treatment of constipation, etc.

From the sixth to the twelfth dorsal stimulation controls the inhibitory action of the small intestine, and of the second, third, fourth, and fifth lumbar, and the first, second, and third sacral, induces inhibition of the large intestine, also second, third, fourth, and fifth lumbar, inhibit for descending colon and rectum. The inhibitory nerve of the small intestine is the splanchnic, while the capillaries contain arterial blood; when this changes to venous, the splanchnics are stimulated, and peristalsis is increased. As certain procedures would cause a stimulant, and others an inhibitory action, static electricity in the form of a spark or the oscillatory wave-current, the induced, the interrupted, continuous, and sinusoidal currents applied through the body may become a mechanical form of treatment and exceedingly valuable in treating conditions referred to. The continuous current is probably more pronounced used with rapid interruptions, in its effect in treating the deep-seated viscera. It is, however, in mechanical vibratory stimulation from some form of vibratory apparatus which will give a great range of utility as regards rapidity and penetration of stroke that we have, perhaps, our most positive mechanical therapeutic agent. Take, for example, a very common condition, viz.: a dilated stomach following a long-standing gastritis and a sub-acute form of duodenitis, with the following pathological con-

ditions: The stomach, which is, in a way, a hollow muscle, is to an extent paralyzed, both in its muscular and secretive functions; the duodenum is affected by the presence of existing catarrhal toxins, bacteria, uric acid; micro-organisms are present in great variety and activity, and constipation arising from deficient or changed secretion or intestinal atony complicates the condition. The indications for treatment are obvious. Strict intestinal antisepsis and rigid dietetic rules will do much to relieve, but there is still a condition left which requires a change in the nutrition of the diseased viscera, and here medication has reached its limit. In a long-standing case it may not be possible to restore the stomach to its normal size, but in my opinion there is no other way by which as good results can be so speedily and satisfactorily obtained as by mechanical means, and this must be employed with as much intelligence in manipulation and sound judgment as one would exercise in using any form of electricity. The technique in any given case should be strictly adhered to, as much harm can easily be caused by careless and improper application.

As space will not permit giving technique, it is sufficient to say that the proper appreciation of the physiological laws referred to above, with diagnostic ability, to eliminate cancers, tumors, and cicatricial stenosis from mechanical irritation, one can make no mistake in employing the methods as suggested.



CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.

Attending Surgeon, American Oncologic Hospital, Philadelphia.

(Continued from page 41.)

CHAPTER V.

SELECTION AND INSTALLATION OF APPARATUS REQUIRED FOR SURGICAL ELECTROCHEMISTRY.

Source of Current.—Careful consideration must be given to the current source in the major operation of zinc-mercuric cataphoresis, employing as it does from 300 to 1500 milliamperes, or even more, during a continuous application extending from fifteen minutes to an hour or more. All of the old-fashioned batteries were grievous failures in the author's earlier work, the most painstaking care being insufficient to prevent faults and failures even after a patient was under the anesthetic. The current mains of an incandescent lighting system are the best possible source of power for this work, and if the system is one employing the 110 volt direct current a suitable controller and meter are the only applying apparatus needed.

If the street mains at hand furnish the alternating current, as is generally the case in the smaller town and cities, it will be necessary to procure also a motor transformer to transform the alternating current into the direct current of the voltage mentioned.

Should neither form of current be available, as in towns without an electric lighting system or at isolated residences, ample power may be obtained from 40 to 60 freshly manufactured dry cells of approved make, and these may often be depended on to do full work for several months.

Direct Current Mains.—Having a direct current supply of 110 volts which is steady and reliable during the hours for this work, the current may be taken from any lamp receptacle by substituting a plug to which is attached a double conducting cord leading to the controller. At the first use of any particular receptacle or socket the polarity of the conducting cords

should be ascertained as follows: Before inserting the plug into the socket unwind two or three inches (5 or 6 centimeters) of the end of the cord, bare the end of each wire, and bend them apart so that they will not come into accidental contact;

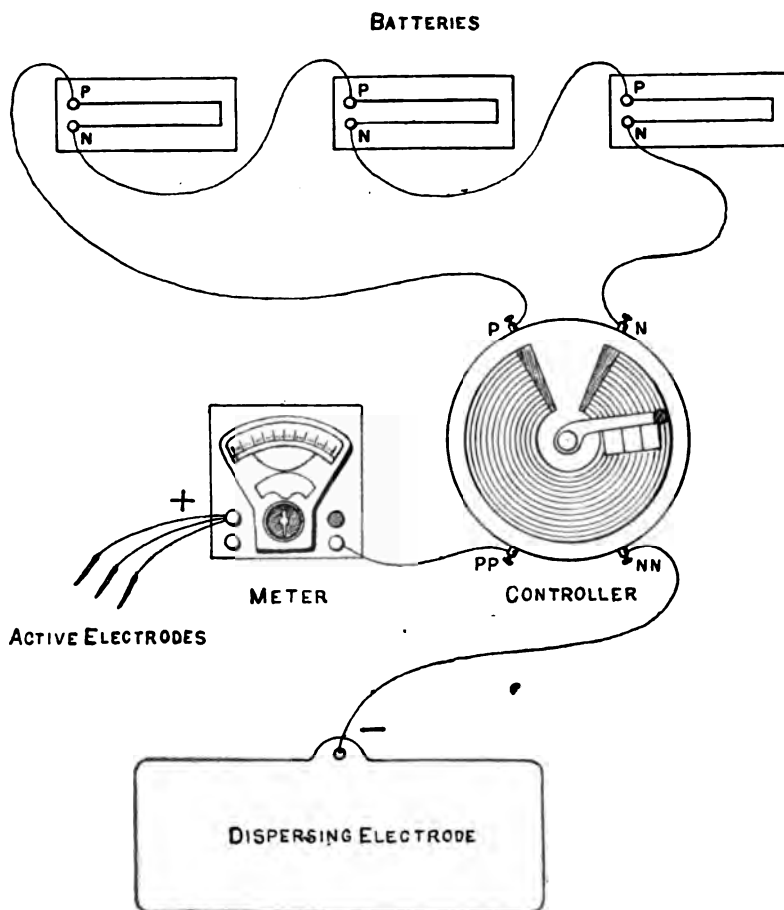


FIG. 2.—Motor-Transformer of Holtzer-Cabot Type, Suitable for Cataphoric and Other Electrotherapeutic Work.

now insert the plug into the receptacle and turn on the current if there be a key for this purpose, then insert both wire ends in water in which a little salt has been dissolved. The active decomposition of the water that results at once will show that one wire gives off twice as much gas as the other;

this wire is therefore of course the negative pole, and should be so marked as soon as the current is turned off, a bit of adhesive plaster with an N marked on it in ink being a permanent mark when twisted about the wire. The polarity of these wires should be tested anew whenever a new receptacle is used.

Having ascertained and marked the polarity of each wire, they are inserted in the P and N inlet posts of the special controller described below, or into the appropriate inlet posts of the cataphoric table. The wires should be left permanently attached to the latter, disconnection being made by removing the plug from the receptacle.

Alternating Current Mains.—To transform the alternating current to the 110 volt direct current a motor transformer is employed. This consists of a one-half horsepower alternating current motor, suitable to the phase and number of alternations of the local system, and a $2\frac{1}{2}$ ampere 110 volt direct current dynamo coupled directly together and mounted on the same base (Fig. 2). A snap switch in the leads from the mains

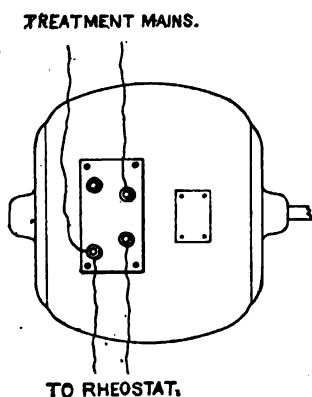


FIG. 3.—Diagram of Connections on Dynamo Portion of Motor-Transformer, to Show Proper Connections.

enables the apparatus to be started and stopped with ease. The dynamo is usually supplied with a rheostat placed in circuit with the field winding. This enables us to vary the voltage of the output somewhat, and is a useful auxiliary to the therapeutic controller. In the Holtzer-Cabot apparatus the current for treatment is taken from the dynamo at the poles

indicated in the diagram, Fig. 3, and the polarity is ascertained in the manner described in the paragraph relating to the direct current.

The current as taken from the dynamo is exactly similar to that from the 110 volt direct current street mains. It is, how-



FIG. 4.—Portable Dry Cell Battery with Switchboard.

ever, unnecessary to have a dynamo give an output greater than two and a half amperes (2500 milliamperes), as this size of dynamo will fully cover the needs of cataphoric work.

Dry Cells.—As before stated, a battery of freshly manufactured commercial dry cells of ordinary size and reliable make furnishes a possible means of power for the performance of a number of major operations. From 40 to 60 are necessary, and if these are assembled in portable boxes of strong build we are enabled to perform major operations at any point within reach of the railroads or other means of transportation, the applying mechanism described below being also portable. The author has traveled thousands of miles with such an outfit, keeping a sharp eye on the battery boxes at every change

of baggage car, the apparatus being ready for action within a few minutes of its arrival at the residence of the patient or the local hospital. These battery boxes may be supplied with a switchboard as in Fig. 4, or with two simple binding posts



FIG. 5.—Portable Dry Cell Battery with Switchboard Raised, Showing Connections.

to each box, to one of which a wire is led from the carbon pole to the first cell. From the zinc pole of this cell a wire is led to the carbon pole of the next, and so on, the final zinc pole being connected with the other binding post of the battery box. The binding posts of the box should now be each marked with their appropriate signs.

When the batteries are to be used the N post of the first box is connected by wire with the P post of the second; the N post of the first box and the P post of the second then being the final poles of the battery. From these posts wires are carried to the controller as described for the direct current of the street mains.

An automobilist's pocket ammeter is useful to detect any weakening of these cells. The voltage is maintained in these cells near the 1.4 volts per cell longer than the amperage, which should not fall below 8 or 10 amperes when short-

circuited through these small ammeters. If any cell falls below 5 amperes it should be thrown out before an operation is attempted.

No other form of primary cell than a good commercial dry cell should be used for this purpose. Storage cells would, of



FIG. 6.—Pocket Ammeter.

course, be an excellent source of power, but the large number of these heavy cells needed to obtain the voltage required makes it impossible to employ this source of current in a portable apparatus.

(To be continued.)



Editorial.

THERAPEUTICS OF INFECTIOUS CONDITIONS.

THE tendency of medical research is now in the quest of serums to antidote infectious diseases. The success of the antitoxin of diphtheria and the streptococcic serum, experiments with various tubercular sera, and the recent unofficial employment of a serum for the cure of cerebro-spinal meningitis, together with the partial success of the opsonic work in accordance with the theory of Wright, afford a ground for much enthusiasm and a hopeful optimistic state of the professional mind in this direction.

There is a great principle involved in the action of these anti-bodies, whereby the body is freed from bacterial infection, by the action within the organism of one germ upon another, or by a toxin upon a germ, or by an influence which induces an active local or general phagocytosis, opsonic or otherwise. These means are each possessed of a degree of merit which warrants continued research. At best, however, the elements of danger are such that while these researches are in progress a sober investigation of other methods of meeting these foes of human life should be encouraged, the efficiency of which may exclude an element of danger, for the control at least of a large number of infectious conditions, effectually meeting the indications. A condition of active general metabolism is the *sine que non* of health, the basis of the body's internal resistance, a fortification against the inroads of infection. The maintenance of health in this respect depends upon regulated exercise, and the preservation of every vital function by proper attention to habit, together with the supply of the proper nutrition under conditions of normal environment. The impairment of any of these prerequisites of health, beyond the capacity of the *vis medicatrix naturæ*, to effect a restitution, is certain to result in a destruction of the functional equilibrium, with a relative depreciation of the internal resistance of the organism. It is under these conditions and through such defects, that infection attacks the organism.

Prophylaxis, with the maintenance of the equilibrium of the body forces, is the greatest safeguard against disease; and carried out in an ideal manner, which it rarely if ever is, it affords the greatest safeguard against the implantation of the germs of disease.

Next to prophylaxis, the early discovery of the onset of an infectious process, with the prompt correction of the conditions which have precipitated it, and the employment of vigorous means for increasing the activity of the body's defences, will, as a rule, ward off an unfavorable issue except in infectious diseases arising from the most virulent sources.

Science has already placed us in command of mediums for controlling the inroads of most of the pyogenic bacteria. The knowledge of the relation of the phagocytes to germ life, and how to bring about an active war upon the inroads of these bacteria at the site of infection, is a great advance, which when fully recognized by a profession, provided with the means of meeting such inroads, will effect much for the relief of human suffering.

Convective heat, and radiant light and heat, the x-ray, the static and high-frequency currents, occupy a most important rôle in the field of the therapeutics of infection. The abortion of every type of abscess, in every accessible site, in the early stages by these means, is as certain of successful results, as any scientific principle applied to nature. The *vis medicatrix naturæ* only needs under conditions of lowered resistance the addition of stimulant effects to the tissues or negative effects to the bacteria, through the employment of these agents, to abort the inroads or farther development of most infectious processes at the onset; and will render great assistance in effecting an early recovery in all cases of infection. The effect of applications to the whole body of intense light and heat, acting from the periphery, and thereby reflexly effecting an active general metabolism throughout the economy capable of working wonders against the inroads of disease and the elimination of the products of infection. Probably no subject at the present time is more neglected by the general profession than the application of these principles; a fact to be deplored when the conditions not otherwise relieved are so universally and so promptly relieved by those who are familiar with their employment. The energetic qualities and general efficiency of these measures in eliminating infection from the human organism is as certain of accomplishment in the hands of those who are familiar with their employment, by the use of one or more of them, as anything in medicine or surgery.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The High-Frequency Metallic Discharge. A New Treatment; Its Possibilities.

By Finley R. Cook, M. D., New York. Dr. Cook's article in the Medical Record, of December 21, making use of the high-frequency discharge, when a metal electrode, or point of insulated wire has been made use of to destroy warts on the hand.

But in his article the idea has been expanded to meet other growths. His interesting article cites 11 cases treated by him.

There is little or no pain from the applications, but sometimes cocaine may be used. The first discharge may be painful, but that deadens the sensation for later discharges of the electricity. He has made use of it in hypertrophied tonsils, acne rosacea, and hemorrhoids.

The only criticism I should make is that Dr. Cook designates this as a "*new treatment*," when many of us have made use of the metallic discharge in that manner and for similar conditions for a long time.—W. H. W.

The Future of Electricity in Medicine. By Dr. W. Deane Butcher, M.R.C.S., F.P.S., in the Archives of the Roentgen Ray, December, 1907.

Referring to the use of high frequency currents, he states that "there seems to be no doubt that auto-conduction and auto-condensation are valuable means of reducing high arterial tension." . . . "According to the rapidity and wave length of the vibrations, it may cause either stimulation or inhibition of the nerve centers, or the same frequency may cause inhibition of one nerve center and stimulation of another." In this way we might obtain simultaneous stimulation of the vaso-dilator and inhibition of the vaso-constrictor center. The very marked action of the high frequency currents upon urinary secretions is probably also due to the direct stimulation of the vaso-dilator centers. The writer considers it unscientific to attempt to taboo the high frequency current, because it has claimed too much and been inappropriately applied, which is the case with any other method, and indeed of all human activities. He considers the high frequency apparatus to be, however, a dangerous weapon in ignorant hands, not a plaything to be trusted with the inexperienced. He calls attention to a dangerous result which he recently saw from the un-

suitable application of high frequency currents. The case was one of cardiac debility, and was treated by the application of a glass exciter over the solar plexus resulting in a remarkable fall of blood pressure accompanied by weak pulse and great exhaustion. He concludes by saying that "the most important advance in electro-therapeutics will be the adequate instruction of the practitioners in the use of such lethal weapons as the high frequency and the x-ray apparatus."

Note on High Frequency Currents in Enuresis. By W. F. Somerville, M. D., Glasgow. Archives of the Roentgen Ray, December, 1907.

The writer places the patient on a condenser couch for from five to seven minutes, after which he places a metal disc electrode, four inches in diameter, and one-half inch thick, and weighing three and one-half pounds, directly to the hypogastrium, connecting it at one terminal to the high frequency apparatus while the other terminal is connected to the metal plates beneath the couch. While using the condenser couch, he uses 150 to 400 milliamperes, but when the metal electrode lies on the hypogastrium, 400 to 700 milliamperes, according to the age, may be safely given to young people. The treatment by the latter method is made from three to five minutes, and administered daily.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

Radium for the Treatment of Cancer and Lupus. By William J. Morton, M. D., New York, Medical Record, November 9, 1907.

The author does not claim to set up radium as a cancer cure, but cites a few selected cases as a contribution to radium therapy. He takes the broad position that there is no agent which will cure every case of cancer; but that the Roentgen ray, radium, trypsin, and amylopsin all exert a determined influence upon cancer growth, and are sufficiently deserving of merit that the practitioner may avail himself of these as well as other agents. The Roentgen ray now, beyond question, cures many cases of superficial cancer, but in actual practice the writer believes that radium is superior to it in similar cases, when we employ the pure radium salt. He calls attention to another advantage of radium over the Roentgen ray, in that the former may be successfully employed by imbedding it in a suitable receptacle within the cancerous mass. He names other reasons for advocating the therapeutic use of radium.

1. Accuracy of dosage. One may use a standardized pure radium bromide whose radioactivity is invariable, the measure of treatment may, therefore, be couched in terms of time units.

2. As regards the gamma rays of radium, their penetrating power by reason of their greater velocity has been shown to be much greater than that of the Roentgen ray. We may, therefore, expect and do obtain a deeper and wider action.

3. In the use of radium if enclosed in aluminum or mica receptacles we utilize the beta or cathode ray. This is not possible except as the secondary radiations from the x-rays, which gives a distinctive difference to the radiations from radium.

4. Finally, the best evidence of the therapeutic value of radium is obtainable from clinical experience. In the writer's opinion it is the best modern treatment of lupus vulgaris, and that the rapid, aggressive, fulminating action of pure radium bromide, applied to the treatment of superficial cancer, or by imbedding it in other selected cases, and the treatment of lupus vulgaris, constitutes a distinct advance in the treatment of these diseases.

The writer employs Lieber's aluminum tubes, containing respectively ten milligrammes each of pure radium bromide as made by Dr. Sthamer, of Germany, of an estimated radio-activity of 1,800,000. The penetrating power of the gamma rays from this equipment is remarkable. An electrode may be discharged while six inches of iron intervenes between it and them. Suspended one foot away from a pistol or rifle containing cartridges, the penetration is sufficient to exhibit in the customary manner of a skiagraph, and with good definition, showing the cartridges within the weapon. One of these tubes placed upon the skin during twenty minutes produces a radium burn appearing within from four to fourteen days and usually proceeding to a secondary stage of serous exudation.

The writer also employs numerous tubes of lower radio-activity, and also celluloid rods and disks made after the method of Hugo Lieber, of New York.

The technique of application varies by reason of the indications and stage of the cancer, but in general, treatment is carried out either by the gradual method extending for several weeks or months at times, or by an aggressive and rapid attack in from one to four sittings from twenty minutes to one-half hour each.

In the latter case it is expected to produce a severe radium burn, but the sound tissue heals rapidly and with good cosmetic effects while cancerous tissue disappears. The writer observes that sound tissue is far less affected by radium than is cancerous tissue. The writer quotes Professor Von Leydon in his statement that after partial dissolution of cancer cells by trypsin there is never a subsequent increased growth either local or general, applies the same remark to the influence of radium, stating that whatever gain is accomplished

remains secured." The author's method of treatment is to introduce an aluminum tube within a very thin gelatine tube, such as is used to shield thermometers, so that every individual treatment has an uninfected shield which is then thrown away. The tube thus arranged is placed directly upon the spot which it is desired to treat and left there for a certain number of minutes, determined by prior clinical experience. He also advocates and practices in selected cases the imbedding of radium tubes within cancerous substances. This has been done both with radium in glass tubes and with aluminum tubes enclosed in celluloid. The tumor is punctured with a large knife or a Keyes cutaneous punch, thus removing a core as for microscopic examination. Into the tumor he inserts the tube. The employment of the Keyes cutaneous punch is to be preferred in cancerous masses of extreme hardness. In some cases a silver shield is placed on one side of the radium for the protection of overlying skin and parts not diseased, permitting several radiations of large tumor masses. In addition to this he applies radioactive water, the emanations of which dissolved in the water travel in the blood stream and diffuse the transformation products of radium.

He also administers an aqueous solution of fluorescin, or of esculin, or bisulphate of quinine, in order to excite these fluids to fluoresce within the cancerous tissue during the radium treatment. He adds that satisfactory work can be accomplished by the pure radium salt, which facts should be recognized, for these salts when impure absorb, as by a sort of screen by reason of impurities within their own mass, much of the radiations desirable for treatment. The writer then reports a few cases to illustrate the foregoing remarks.

A most remarkable result was obtained in the treatment of a large sarcoma of the upper arm treated by an imbedded radium tube and fluorescence, and remains apparently cured now at the end of two years. Illustrations show, first, a skiagraph of the upper third of the humerus when it came under observation; a second shows the arm under treatment with the imbedded tube of radium inserted in the mass; and the third shows a reduced tumor of the bone inactive two years after treatment. When the patient came under treatment an opening was present from which issued a continuous discharge of pus. The patient presented the appearance of extreme cachexia. No hope was entertained of saving her life. The bone had undergone spontaneous fracture of the central portion and required a splint for support. The case seemed hopeless, but as a last chance a glass tube of radium was inserted in the central portion of the diseased area, which was easily accomplished from the fact of a large central opening. The radium employed was the French chloride of 20,000 radioactivity, 100 milligrammes. The patient was

given in addition six drops, three times daily, of 1 to 30 aqueous solution of fluorescin and four grains of bisulphate of quinine daily. Also she took radioactive water, and no other medication or any other treatment such as the x-ray was used. Within ten days after the insertion of the radium there was great diminution in the discharge and at the same time the pain which had been somewhat severe had entirely ceased. In about four weeks the patient was enabled to dispense with the splint. Within a period of two weeks she had gained seven pounds in weight and her cachectic appearance began to disappear. She was discharged from the hospital in about two months, having gained seventeen pounds in weight. The radium tube was then removed and the patient allowed to return home. At the end of three months she returned for examination. The wound was nearly healed and the arm looked so well that the patient was sent back home without further treatment. The opening finally closed in March, 1906. The arm has given her no trouble since that time. She uses it freely for all purposes. She has gained more than thirty pounds in weight and appears to be well. While the result in this case is remarkable, the author at the end of two years states that "It is never safe for many years to say the word cure in a case of cancer, but we can say at least that the patient's life has been saved for the present and that the sarcoma appears to be cured to date."

The second case reported as the preceding was referred by Dr. Kemble, of Kingston, N. Y. The condition followed an accidental cut with a hatchet twenty-five years previous and a kick by a horse two years previous on the same spot. The swelling was first noticed four years ago. Then the tumor was about the size of a hen's egg. Dr. Kemble had removed as much of it as possible. Microscopical examination by Dr. T. H. Brooks, of the Post-Graduate Medical School and Hospital, revealed the "structure of endothelioma," etc. Dr. Kemble's idea in referring the case was to cure if possible those portions of the disease which he had been unable to remove by the knife. A glass tube was inserted containing 100 milligrammes of Curié radium, 10,000 radioactivity, and at the same time aqueous solution of fluorescin 1 part to 30, six drops, three times daily, was administered. The patient made continuous and rapid improvement. He gained eleven pounds in weight, his knee was relieved from pain, and gradually grew more flexible. On June 1st the entire wound had healed and all signs of inflammation and disease had subsided. The tube was then removed by a fresh incision and a high-power radium, 1,800,000 radioactivity, was placed within the wound for fifteen minutes to prevent soiling of the tissue by any possible disease which might remain. This case illustrates the method of imbedding glass radium tubes within cancerous tissue and also illustrates the effect of low-power radium in

causing a healing effect upon cancerous tissue. The patient on October 25, 1907, was perfectly well and attending to his usual avocation.

Case three was a case of lupus vulgaris in a prominent physician of twenty-one years' standing. The entire left side of the nose up to the bone of the bridge of the nose had been destroyed. The edges of the gaping wound were actively diseased, ulcerated, and discharging. "Treatment consisted of the application, on May 25th, of ten milligrammes of pure radium bromide enclosed in an aluminum tube for one hour on the tip of the nose. On May 27th, of twenty milligrammes, two tubes on the tip and on ala nasi for four hours. On the 28th, of twenty milligrammes on the septum, a part of the upper lip, and where the ala nasi joins the cheek, for four hours. Total, fifty milligrammes for nine hours in three applications. The entire open area treated was irregular in shape and would aggregate about one square inch. During the first week there was not much change noticeable except that the open areas were a little more active than usual. There was no pain or discomfort whatever. During the second week there was a more decided increase in the symptoms. The sloughing became more active in the diseased areas and there was a large amount of watery exudation which soon dried and formed heavy crusts over the entire area where the skin had sloughed. These crusts had to be removed several times daily. The open sores or sloughs increased somewhat in size, but there was little or no swelling elsewhere. Very little discomfort was experienced. Early in the third week the symptoms increased in severity, the upper lip was swollen to almost twice its size, but there was little or no swelling elsewhere. The entire diseased area where the radium was applied became quite sore and painful. This was especially marked on the tip of the nose and where the septum joins the lip. The physical and nervous exhaustion was intense, with marked mental depression. The sloughing and watery exudation began to diminish in certain places. During the fourth week the swelling of the upper lip began to subside, but the area around and beneath the eye and the upper part of the nose, which had not been treated by the radium, began to swell and became quite sore. For a few days the eyelids were swollen until they were almost closed. The discomfort here was equal to that previously experienced in the area upon which the radium tubes directly rested. There was a number of small lumps or elevations in this area, some as large as a pinhead and some larger. They became inflamed and very soon the slough below extended upward to the inner canthus of the eye and cleaned out all the lumps or swellings just mentioned. During the latter part of this week the swelling and all other symptoms began to subside very rapidly and

healing began in all parts and made rapid progress. The physical and nervous depression rapidly gave way to conditions just the opposite, and instead of the despondency were buoyancy and a sense of extreme happiness. At the latter part of the fifth week all parts were healing rapidly and cicatrization was nearly complete. The swelling in all parts had entirely subsided and no discomfort whatever was experienced. At no time was the suffering sufficient to prevent his attending to his professional duties." The disease appears at present to be completely cured.

The writer reports two more cases of lupus vulgaris and several cases of epithelioma in which the results were uniformly successful. He reports also a case of carcinoma of the chest. The tumor mass, which measures three inches vertically by one and three-fourths inches horizontally, consists of two portions, a lower, intensely hard disk-like mass, two and three-fourths inches in diameter, and an extending portion upward, less hard, but massive. Over the disk-like mass exists a distinct depression where the skin is involved and drawn inward. Also an enlarged gland in the left axilla. Examination reveals a very extensive network of inflamed lymphatic channels leading off toward the axilla, with evidence of the occurrence of an extensive infiltration of the chest wall. Radium was applied of 1,800,000 radioactivity, and the application was pushed even at the expense of the inevitable radium burn of the skin, with the consent of the patient.

Beginning May 29th, the patient received seventeen days' treatment almost daily at sittings of three hours, each of the radium tubes placed at different points over the tumor mass, particularly over the disk-like depression of the scirrhus plaque. In about ten days every sign of tumor had disappeared except the plaque. At the end of the seventeenth day this scirrhus mass was reduced to a small lump about the size of the end of the little finger. The corded lymphatics could no longer be found; the axillary gland remained about as before. The skin area of the tumor presented the appearance of an intense radium burn just entering upon the serous effusion stage. The treatment was forced because the patient was obliged to return to a distant State, and the result of the recovery from a radium injury and of the healing of the tumor could be awaited while at home. The ultimate outcome of this case remains to be seen. This case illustrates the overwhelming attack by means of radium in contradistinction to its gradual influence, and, second, the fact that an extensive and recent carcinomatous growth may quickly melt away, so to speak, under the use of radium.

In conclusion the author observes that the pure radium salt has a decisively beneficial action in the treatment of some cases of cancer and lupus.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Report of Eight Hundred Dermatological Cases Treated With X-ray and High Frequency Currents at the Mount Sinai Hospital, in New York. N. Y. M. J., November 9, 1907.

Stern reports these cases. Among them are cases of epithelioma. He considers that his success in the treatment of these cases by means of radiant energy depends entirely upon his selection of cases, or in other words, if he selects his cases his success is great. He finds that in properly selected cases there is no question as to their value, while in other cases the x-ray is of little use. He thinks it is very hard to lay down any fixed and definite rules as to choice of cases, as he thinks experience is the important factor. As a general rule, the cases best adapted to radiotherapy are those which are situated on the surface of the epidermis, while deeper seated, nodular epithelioma are best treated by other methods. Small nodular epitheliomata situated on the surface of the skin can often be readily destroyed by a few applications of the high frequency spark.

The value of the x-ray in psoriasis is well established. The length of treatment necessary to cure it depends very much upon the nature of the lesion. Acute and subacute lesions, as those which do not have much induration and are covered with small scales, yield much quicker to treatment than the old chronic indurated spots covered with thick scales. Those situated on the face and scalp generally yield quicker than those on the trunk and extremities. He does not like to treat psoriasis when situated on the trunk with the x-ray, on account of the possible injury to the underlying viscera. While it does not always prevent a return, yet the author thinks that after a cure has been made with the x-ray there has been a slight dermatitis and exfoliation of the epithelium. It seems that the recurrence is longer delayed and not so apt to return, as it is after any other form of treatment.

He considers the results obtained in the treatment of eczema by radiant energy very satisfactory. Eczema of all varieties yields readily to the x-ray. The moist, weeping kind generally requires less treatment than the dry, scaly papules. He has frequently seen cases of years' standing, that have resisted every other form of treatment, cured with the x-ray. One hundred and twenty-five cases of eczema were treated with generally good results, in all those who persisted with the treatment. He believes that the most gratifying results in the field of radiotherapy have been obtained in rhinoscleroma, but the best results were accomplished in sycosis in comparison with other methods of treatment.

The Use of X-ray from the Point of View of the General Practitioner. By E. Pierson, M. D. N. Y. M. J., October 5, 1907.

He describes some of the many uses to which x-ray may be put and states that its value is greatly underestimated. Under therapeutics he makes the following classification:

(1) The x-ray causes atrophy of the appendages of the skin. (2) It stimulates the metabolism of the tissues. (3) It destroys certain pathological tissues. (4) It possesses marked anodyne effects. (5) A possibility of controlling or altering the opsonic index is yet to be settled. (6) The ray possesses no very definite action in destroying micro-organisms.

Tuberculous diseases respond most favorably to the x-rays. Lupus vulgaris is one lesion in which the most brilliant results are obtained. Tuberculous joints and glands also respond favorably, but the results have not been satisfactory in the case of pulmonary tuberculosis.

The editor of this department agrees with the author in everything except here in his conclusions in regard to pulmonary tuberculosis, and thinks that as all other tubercular conditions respond readily to the x-ray that by proper management of the systemic condition the x-ray can be very useful here also. In fact, he considers it the most useful of any one agent in the treatment of this disease.

Multiple Carcinomata Following Chronic X-ray Dermatitis.
N. Y. M. J.

Porter and White offer the following conclusions: First, for the atrophic condition of the skin and the tlangiectases, nothing can be done. Second, hypertrophic changes, keritoses, and warts may with safety be treated in the usual manner. If such treatment fails excision with or without skin grafting will probably relieve the pain and result in a cure. Third, excision and grafting will prove to be the best treatment for recurrent fissures. Fourth, all ulcerations which, under ordinary treatment remain open after three months, should be thoroughly excised and very carefully done. The subsequent treatment, if any, under microscopic examination, should be skin-grafting, further excision and grafting, or amputation. Fifth, he hopes with increased knowledge these lesions may disappear. Sixth, all persistent x-ray ulcerations should be excised as early as possible to prevent malignant degeneration.

Leucemia and Roentgen Ray Treatment.

Mahnert and Schnopfhagen observe the Roentgen ray is the best of all methods of treating leucemia. It can well be compared with the use of digitalis in certain conditions of the heart, while it may not produce a permanent cure, but the normal intervals between the attacks can be increased. The pathologic conditions of the blood disappear, leaving the blood

normal during the interval. The fever disappears and the general condition of the patient is improved. He feels much better, weight is increased, the enlarged spleen and lymphatic glands decrease in size, pains in the bones disappear. The Roentgen ray cannot be used in prophylaxis, but the daily treatment of the spleen, marrow, and lymphatic glands will produce a quicker removal of the symptoms. In repeated attacks the ray will likely lose its influence, the tumor of the spleen is likely to return followed by increase of the glands, and osteoscopic pains are likely to return and patient grows worse in spite of the rays. The myelogenic cases seem to give a better result under x-ray treatment than the lymphogenic.

Sarcoma of the Eyelid with the Report of a Case in an Infant Seven Weeks Old. Henry S. Wieder.

This interesting case, which is reported very thoroughly by the author, is interesting first on account of the age of the patient, seven weeks old, the tumor appearing as a small growth on the right lower lid. Microscopical examination after its removal demonstrated it to be a sarcoma, which began to return in less than two weeks after removal, when it was sent to Dr. Pfahler, who treated it with the x-ray so successfully that in three months the growth entirely disappeared. The child has remained well up to the present time.

Tuberculous Adenitis Treated by Radiotherapy.

Berjon reviews a treatment of tuberculous lymphangitis of tuberculous origin and reports twelve cases treated by radiotherapy. He found it a valuable adjunct to the usual treatment, and states that in some cases it acts with the certainty of a true specific, melting away the adenopathies in the more favorable cases very rapidly. The effect is seen first upon the peri-adenitis, which surrounds the glands and agglutinates them in one solid mass. This exudation disappears and the individual glanglia appear. Subsequently the action is slower, but the glands gradually become smaller, harder, and more fibrous, completely disappearing or leaving a small fibrous residue under the skin, which may disappear in two or three months. The very large growths may be reduced to such size that they can be easily removed. The good effects are obtained in from eight to twelve séances. The treatment should be spread out over two or three months, so as to avoid a dermatitis. When the glands begin to suppurate, x-ray will hasten the process. Where this occurs, the pus may be removed by aspiration, and the ray will heal the process without a visible scar thereafter. In old cases in suppurating sinuses the treatment has an excellent effect. After the treat-

ment there is a temporary rise of temperature of short duration. When used properly there is no danger in the treatment.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Diphtheria and Its Serum Treatment.

John Wyllie of Hull, England, writing in the Monthly Cyclopedic of Practical Medicine of October, 1907, raises the question as to the value of anti-diphtheritic serum in the treatment of diphtheria.

From his observations he admits that its use shortens the first stage of the disease, helps in the absorption of the membrane, and renders laryngeal stenosis less frequent.

He thinks, however, that the post-diphtheritic paralyses are as frequent as they were without the use of antitoxin, and also states he gathers "that notwithstanding the free use of antitoxin, the mortality is as great as it was in the pre-antitoxin days; some people, indeed, say that it is greater. Be that as it may, in the face of published statistics as regards both mortality and those post-diphtheritic diseases which eventually recover, it is obvious that the toxins of the disease have not yet been opposed by their true antitoxin."

The Tuberculin Test and the Opsonic Index. Their Value in Diagnosis of Tuberculosis in Children.

Rotch, in the Journal of the American Medical Association, emphasizes the importance of making an early diagnosis in tuberculosis especially in children, as upon it is dependent the cure in such a large proportion of the cases. As methods for making such diagnoses they suggest that by tuberculin injection and that by the opsonic index. As to the former, it should be used only by trained observers, and then with the greatest care. It may be used in all cases with a temperature under 100° F. A positive reaction occurs within 8 to 24 hours, characterized by a rise in temperature accompanied by more or less constitutional disturbance, both of which soon subside. Two cases are given to illustrate the dangers of too large an injection. Doses for children may be given in graduated doses from 1-10 to 10 milligrams. In case successive doses are necessary they may be given at three-day intervals. He has found that the reaction was positive in 95% of the cases but also that a negative reaction did not exclude the presence of a tuberculous lesion. He advocates the determination of the opsonic index in those doubtful cases in which, on account of prostration or high temperature, tuberculin injections cannot be employed.

The Coley Treatment of Inoperable Sarcoma by the Mixed Toxins of Erysipelas and Bacillus Prodigiosus.

W. E. Green of Little Rock, Arkansas, describes the treatment of such a tumor of the abdominal wall in a young boy, aged 20. The diagnosis of small round-celled sarcoma was made microscopically. The symptoms and physical signs were those of a malignant neoplasm. The treatment extended over a period of five months. The initial dose was $\frac{1}{2}$ minim, gradually increased to 15. Sixty doses were given. In all $1\frac{1}{2}$ ounces of the toxin were administered. The injections were usually given in the tumor, and at first were followed by a most violent reaction.

At the end of the treatment no trace of the tumor mass could be felt. During administration of the serum the boy gained 40 pounds and appeared perfectly well when discharged.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

The Rôle of Hydrotherapy.

In an address delivered at the twenty-sixth congress of the German Balneologic Association, Brieger (Berliner klin. Wochenschrift) emphasizes the fact that the benefits of hydrotherapy are becoming better realized, and that it is overcoming the prejudices of all. He is in charge of the Institute of Hydrotherapy connected with Berlin University and states that seven thousand different applications of hydrotherapy have been given at his institute, more than ten thousand patients having passed through his hands, and ninety-three scientific works have issued from the institute. He has had the training in hydrotherapy of four hundred and forty physicians from Germany and abroad, and of two hundred and eighty-three students. He reviews some of the principles of the science, among them the intensity of the action of hot-water baths in chlorosis, nephritis, syphilis, and for young gouty subjects. Winternitz has established that these hot baths accelerate the oxidation processes even more than fever. Krebs and Mayer have also demonstrated that this form of hydrotherapy alone is able to change the number of blood corpuscles and the specific gravity of the blood. Local applications of heat in gout are made preferably with cotton wrung out of hot water and covered with rubber tissue. He has been ordering patients with chronic rheumatism or gout to drink a quart and a half a day of distilled water for a month or two. He has never noted any inconveniences from it, nor any striking benefit. Corpulent persons are given exercise in tanks of water after a light bath and rub-down. More and more water is allowed to flow into the tank, and the temperature is constantly reduced, the

patient being instructed to keep the water constantly in motion, with an occasional rest.

Balneotherapy in Complicated Heart Affections and Failing Compensation. By M. Fisch, in the Berliner klinische Wochenschrift.

M. Fisch analyzes the lessons learned from long experience at Franzensbad. Ascending graduation of the carbonic acid and chlorids in the balneotherapy combined with rational gymnastics of the heart, possibly massage of the organ, both individualized to fit each case and to restore compensation, are the main principles in treatment, he says, although courses of mineral waters, diet, climates, rest in bed, heart tonics, ice bags, and puncture for relief of dropsy, all have their place. He relates a few cases in detail to illustrate his success in treating serious forms of cardiac disease on these principles.

Sunshine Versus X-rays in Tuberculosis of the Joints and Bones.

In an article on this subject Willard makes the statement (Brooklyn Medical Journal) that "sunlight, fresh air, and good food, together with fixation and protection of the affected joint, are the most important agents in the contest with tubercular infection. Direct exposure to the rays of the sun is essential, and all hospitals should be provided with solaria, or sun-porches, and roof-gardens. Patients lying in bed should have the diseased joints exposed to the direct rays of the sun, their head and eyes being protected by green glasses or shades. The joints may be covered with blue, so as to secure easiest passage of the ultra-violet actinic rays, and local medications rich in iodine may also be employed as desired. Tent-life on the hospital grounds, or better, in the open pine forest, can be successfully employed through both summer and winter."

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

CHAPTER II.

CONVECTIVE HEAT.

Convective heat, in contradistinction to *radiant heat*, possesses the advantage of being a convenient means for domes-

tic and professional administration under conditions in which the combined heat and light radiations from the sun, or the electrical incandescent or arc light, are not accessible nor convenient, and may be preferred in certain cases. The physical difference between these two methods of heat administration for therapeutic purposes is at once suggested by the distinction between radiation and convection.

Radiant energy projected against the tissues, penetrates to considerable depth as the radiant heat energy moving with great rapidity impinges upon the tissues of the body. Administered from radiant sources, the action is not to the same extent limited to the circulating fluids of the body, but acts upon all other structures upon which the radiations impinge and to a greater depth; including all cells of the muscular, nervous, and connective tissue structures; thereby carrying into the tissues degrees of heat, which are not rapidly dispersed by convection, and raising and maintaining the temperature of the tissues to a higher degree than with the convective methods of administration; the influence of which, applied to the surface of the body, does not permit the penetration of the heat to any considerable depth as has been well shown by Gilman Thompson and others. By the convective methods, the blood becoming heated is rapidly conveyed onward, raising the temperature of the body, but resulting under normal conditions, in the induction of intense hyperemia and perspiration, followed by evaporation with the secondary cooling effect of latent heat absorption, thereby maintaining normal blood temperature through the body. Another advantage is also conserved—the elimination of effete material through the activity of the sweat glands. The areas immediately contiguous to the application of convective heat, become at first hyperemic through the stimulating effect of the application, thereby permitting a larger volume of the blood stream to become heated and coincidently other actions take place within the tissues in the vicinity, the importance of which will be subsequently considered.

In the application of convective heat, *moist* and *dry*, the following methods are employed:

The application of dry heat to the surface of the body may be made with temperatures ranging from 150° to 200° F., tolerated without covering. It is readily apparent that dry

heat possesses certain distinct advantages in cases demanding a marked degree of general peripheral stimulation, and coincidentally in a dry air a rapid absorption of heat by the prompt evaporation of perspiration takes place, thereby facilitating profuse elimination of effete and toxic materials and inducing a marked degree of end nerve stimulation followed by prompt responses of the vascular and respiratory centers. Moist heat applications do not permit of local evaporation, though the heating of the blood does induce perspiration to a degree from the surface of the body not exposed to the direct application of the moist heat. These distinctions render the two forms of convective heat application of distinct advantage or disadvantage according to the condition for which it is employed.

The means of applying moist heat have been long in vogue and comprise the employment of poultices, a combination of kaolin and glycerine, or the familiar antiphlogistine administrations, as well as the use of douches, and the general application of steam or Russian baths. Moist applications may also be applied by placing a damp flannel cloth over the surface treated, over which dry heat should be applied from hot flannel pads, hot water bags, or other heated material.

The method of employing moist heat by application of local poultices, or with hot water bags, pads or other heated materials placed over moistened flannels, or the employment of kaolin cataplasms, or antiphlogistine, heated as hot as can be borne, the heat being maintained in all cases by frequent changes of the poultice or overlying material which give up their heat least rapidly, as water in bags, or heated flannels, or heated objects wrapped in flannel. Another well recognized method of applying heat to the cavities of the body is by means of hot water douches or enemas. For *general* applications of moist heat, the hot bath or Turkish or steam baths are the means usually employed.

The administrations of dry heat are best executed locally by means of the hot water bag wrapped in dry flannel cloths to prevent the too rapid escape of heat, or by means of the various dry hot air apparatus manufactured for local and general treatment, by the application of other heated substances to the surface or by the use of Turkish baths. *The application of dry hot air* by means of the hot air apparatus, the body being wrapped in Turkish toweling, partakes to a slight degree

of the character of moist applications, the perspiration constantly escaping from the body to be absorbed by the Turkish toweling, but to no extent approaching the degree of moisture of the wet applications.

The methods of applying moist heat are in principle the same; the object being to maintain a temperature as high as can be borne on the surface of the body or in the cavities for periods of time, varying with the indication for relief of the affection under treatment.

The poultice, the oldest popular form of heat application, derives its efficacy from the length of time which it will maintain a higher temperature than the body. The material best suited for the purpose is therefore one which will hold the heat for the longest time. Flax-seed has generally been the material preferred. The writer recalls the old way in which the poultice was used by the layman and the physician who little appreciated the *requirements* of the poultice. A thin paste applied hot, as if the virtue lay in the paste, but not changed for hours, or a day, was too often the error of our ancestors and their patients. By these it was little realized that the object of the poultice was the application and maintenance of intense heat for its therapeutic properties.

Time has practically displaced the poultice as the institution of the hot water bags and the later preparations of *kaolin* cataplasms of which the proprietary preparation, *antiphlogistine*, was the earliest if not the best product of the kind. It possesses such advantages over the sodden poultice that the latter is employed relatively little by the present generation. In his own private practice the writer, before the days of antiphlogistine and before the general use of the water bag, recognizing the principles of heat application, instituted for his own cases the employment of large, thick, woolen pads, made of old material quilted together in pads of one and one-half to two inches in thickness, and of sizes large and small to meet varying conditions: two of them being always in requisition. It was the custom to apply the heat in this manner by placing one thickness of flannel cloth wrung from hot water over the inflamed area, following, usually, the application of a sinapism, alternating the application of these two pads every fifteen or twenty minutes, thereby maintaining for hours an intense application of moist heat, the changes being effected without exposing the surface to the cool air of the room.

The hot water bag may be employed in the same manner, but its weight is often objectionable. When used, if wrapped in flannel, the heat is preserved for a longer time. When of the proper size, if the water is frequently changed, it is a convenient and practical means of maintaining heat application.

With *antiphlogistine*, the proprietary preparation, or the kaolin cataplasm, is added the hygroscopic glycerine which is capable of abstracting considerable fluid from the tissues—another advantage particularly in inflammatory conditions associated with infiltration. When this or similar preparations are used they should be applied in a thick coating and as hot as can be borne directly to the bare skin. It is desirable in most cases to maintain the heat in these materials by the application of dry heat over all, as of the hot water bag, the additional application thereby maintaining the heat as long as is desirable. In these applications the effect is derived from the dry heat and the combined depleting effects of the glycerine in combination with the heat conducting qualities of the material of which they are composed.

The Russian bath is deservedly the least popular of all of the moist applications because the patient is not only subjected to intense heat in a moist atmosphere, and the necessity of employing lower temperatures because the moisture does not permit of ready evaporation from the surface of the body of the perspiration, and at the same time subjects the patient to the inhalation of the heated steam. The method is of too little therapeutic value to deserve more than mention of its characteristics. Administrations of convective dry heat in a hot box or the Turkish bath in such a manner that the perspiration will be rapidly evaporated, are far superior in their effects to the use of the moist steam bath.

The hot water bath as a general application possesses an advantage over the Russian bath and is a convenient method of inducing prompt relaxation or reflex stimulation under conditions in which it would not be convenient to administer the Turkish or dry hot air bath.

The hot douche for the employment of heat by means of hot water, is the recognized method of administering heat to the cavities of the body. The method was first accorded urgent recommendation by Dr. Thomas Addis Emmett, of New York. The value of this measure is appreciated by the profession at

large; but too often douches have been administered in a perfunctory manner, the necessity for maintaining the temperature at 108° to 110° F. for long enough periods of time not having been generally appreciated by many who have employed and prescribed it. The value of this method was ably described in the work of Dr. Emmett.

The administration of dry heat may be made either by means of apparatus constructed for the purpose as the local and body hot air apparatus, or by means of light baths which combine the effects of radiant and convective heat; the accumulated heat in the inclosed cabinet having the convective characteristic with the radiant heat added.

Another method which is practical at the bedside is effected by placing alongside of the patient, covered with one thickness of Turkish toweling to prevent the bottles of hot water from coming in contact with the skin, or by wrapping the receptacles in moist or dry flannel cloths, as many gallons of boiling hot water as is desirable, covering all with flannel blankets. In this manner dry heat may be applied with pronounced effect at a temperature of approximately 200° F. and maintained for as long a time as desirable.

When the local or body hot air apparatus is employed, the parts exposed to the heat should be wrapped in two or three layers of Turkish toweling so applied as to come in contact with every part of the surface so exposed, in order that the perspiration as it escapes from the tissues may be taken up by capillary attraction from the surface by the little wicks of the toweling. At any part of the surface that is not in contact, drops of water will collect, boil, and scald the surface; for with the temperatures employed, 300° to 400° F., the water will be readily raised to 212° by the penetration of heat through the wrappings. The rapid evaporation from the skin under these conditions permits an intense application of heat to the surface under the above precautions, with the induction of intense hyperemia and without danger to the tissue so exposed, offering one of the greatest facilities for the induction of profound reflex stimulation and intense hyperemia so valuable for the treatment of infectious troubles, as well as inducing pronounced elimination through the agency of the perspiration.

The hot box, used in connection with hydrotherapeutic applications, is so constructed that the patient, seated upon a

stool, nude, with the head protruding through an opening, which closes about the neck, is exposed to an influx of dry heat at temperatures from 200° to 225°. This method is so employed, when it is intended to be followed by the application of the hydrotherapeutic douche, spray, or plunge, the sudden changes of temperature being employed to induce extreme degrees of reaction. *The light bath*, as employed by Winternitz and his followers in connection with the hydrotherapeutic establishments, is rapidly replacing the hot box.

The Turkish bath administered to the patient nude in a room heated to a temperature of from 150° to 170° F., is a popular method of applying heat for the induction of perspiration. The particular objections to this method are that the patient is obliged to inhale this heated air, and that with the head in the same temperature, moist towels but partially relieve the disagreeable effects of cerebral congestion. This method of treatment is as a rule employed in connection with rubbing, kneading, and massage, and possesses certain advantages of a popular sort, but is not calculated for use in the treatment of localized conditions, or when there is indication for profound effects upon general metabolism.

The physiological effects of convective heat give it rank among the most valuable of the therapeutic agents. It occupies a well recognized place of great utility in the sanitariums, at the bedside, and in the office of the practitioner. The effects may be divided into local and general.

The local applications of convective heat as applied to inflammatory conditions, from the point of view of a local constricting, was ably described by Dr. Thomas Addis Emmett in the third edition of his work on "Principles and Practice of Gynecology," page 111, in the following language:

"Cold is a prompt exciter of reflex action by which the vessels are made to contract, but on reaction taking place, the parts will become more congested than before, both the arteries and the veins being distended.

"Heat, unless at a temperature that would destroy the parts, does not act so promptly in causing this contraction as either electricity or cold. In fact, its immediate effect is to cause relaxation, and to increase the congestion of the parts; but, if its application is prolonged reaction ensues, and contraction takes place; in other words, the reaction from heat is contraction. Under the increased nerve stimulus the capillaries are excited to contract, this effect extending also to the coats of the larger vessels, and as their caliber becomes smaller the congestion is diminished. The popular belief is that heat relaxes and increases the congestion of parts, and such indeed is the case at first. But a hot poultice is never applied with the object of increasing the congestion, but, as any 'old wife' would express it, to draw the 'fire' or inflammation out; in other words, it lessens the congestion by stimulating the blood-

vessels to contract. That such is the effect, from the prolonged use of a poultice, is familiar to everyone, and is well shown by the blanched and shriveled appearance of the tissues after its removal. The hands and arms of a washerwoman, when in hot water, become swollen at first, from the increased flow of blood to them, but it is a well-known fact that they afterwards become markedly shriveled.

"Placing the hands in cold water at once causes the skin to shrivel, as the vessels are stimulated to contract, but we know that reaction promptly comes on, and a larger quantity of blood returns to the parts than was driven out. But, after soaking in hot water, the skin does not recover its natural appearance for hours, since the capillaries remain contracted. In their return to the natural state the reaction does not go on to a paralysis of over-distention, and hence there is no subsequent congestion. The immediate effect of cold upon the capillaries, therefore, is contraction, and with reaction comes dilatation; but the reverse is true of heat, which causes at first dilatation, followed by contraction."

Acting upon the principles laid down in the above explanation of the effects of heat and cold, the author has made use of these agents for more than twenty years. At the time of the publication of the third edition of Dr. Emmett's work (1884), there was no published knowledge of the action of the phagocytes—connective tissue, cells (macrophages), or leucocytes (mycrophages)—which envelop germs and devour them. The significance, therefore, of the induction of intense local hyperemia and the fact that such hyperemia favored destruction of microbes, could not then be appreciated. At this time, however, when it is a well established fact that the body in varying degrees depending upon the physical condition of the individual is capable by its own defenses of destroying infectious elements through the agency of these active cell bodies, the recognition of phagocytosis is of the greatest significance.

That in the early stage of superficial suppurating processes, the application of heat, with the proper degree of energy, is a most certain means of resolving the process, has been established by the writer and many other observers by practical experience.

There are several possible factors which may be active in effecting the resolution and healing of septic processes as induced by the administration of hot applications. (1) The increased hyperemia occurring with tissue relaxation, which is present during the early part of the heat administration, brings into the involved tissues a greater number of leucocytes in proportion as the volume of arterial blood is increased, together with an increased amount of oxygen, so essential to local metabolism and prompt diapedesis of the leucocytes. (2) The profuse local and general perspiration induced, alters

toward normal the fluids in the field of involvement and coincidentally eliminates to an extent other materials affecting the constitutional condition of the patient possibly favoring a general phagocytosis. (3) The action of heat, upon the superficial tissues, may coincidentally inhibit the activity of the microbes, or by altering of the constitution of the fluids, as suggested, produce a larger degree of positive chemotaxis; or (4) the production of more active metabolism in the tissues will tend also to increase the natural fortifications of the involved tissues, increasing the activity of the macrophages.

Clinical experience has well demonstrated the efficiency of the hyperemia and stimulating effects of heat in effecting the local destruction of infection—a fact worthy of investigation and definite determination as to whether in the workings of the *vis medicatrix naturæ* the fever process is not a condition created for action unfavorable to the infecting microbes, by coincidentally favoring a positive chemotaxis or action tending to limit the disease. The remarkable effects derived from administrations of dry hot air in the destruction of local and general infection with the coincident falling of the body temperature to normal, would seem to indicate that the workings of nature's processes against infection are normally by raising the body temperature to assist the phagocytes to destroy the microbes by the induction of such increased body temperature—the fever. If so, it is evidently an error, except under conditions of extreme hyperpyrexia, to interfere with body temperature, and rather than employ cold baths, to institute the use of the body dry hot air or light baths to assist nature, in increasing the activity of the phagocytes.

The following observations made by the writer, with Drs. Grad and Munday, would seem to fortify this hypothesis. A patient *in extremis* from general septicemia, three weeks after a difficult surgical operation, with the characteristic feeble pulse, livid countenance, and a temperature of 105° F., was wrapped by the usual method in Turkish toweling and placed in a body hot air apparatus at a temperature of 300° to 350° F., and after thirty minutes removed with a full strong pulse, a marked hyperemia of the skin, and a mouth temperature of 103° F. Eight hours later the temperature was normal, and the patient convalescent in ten days. This extraordinary result could only be explained by (1) the induction of an active phagocytosis with a positive chemotaxis; (2) stimulation by heat of the deep spinal centers, particularly the cardiac and respiratory; and (3) the elimination of toxins and other bodies through the agency of the profuse perspiration induced by the high temperature.

The writer has invariably observed the rapid fall of temperature following the application of heat to areas of local infection as in suppurative tonsilitis as well also in cases in

which the static current has been employed for the relief of early local infection.

The action of local dry heat on localized septic infection, when high temperatures are employed as in the case above described, has been uniformly successful in the writer's experience even in cases of extensive local infection involving the hand and arm and also in cases of gangrene, all tending to confirm the physiological effect of high temperature in relieving local as well as general infection.

In conditions of poor metabolism, arising from bodily inactivity, excesses in diet, and auto-intoxication, the effects of convective dry heat or the combination of radiant light and heat together with convective heat, as administered in inclosures with the high candle-power incandescent or arc lights, or better in the incandescent electric light bath, are remarkably efficient in promoting the elimination of waste products through the skin, and coincidently by stimulation of the deep spinal centers, the effect of exposure of the surface to intense heat thereby inducing greater activity of the other channels of excretion and elimination. This fact is clinically well demonstrated by chemical analysis of the secretions and relief from conditions of auto-intoxication, nephritis, and gouty and rheumatic affections. It is an undoubted fact that from the effects of profuse perspiration, the sweat glands do eliminate nitrogenous, toxic, and other effete materials from the organism, which in nephritis is wonderfully effective in relieving the labor of the diseased kidneys, and remove the danger from other grave conditions.

The action of dry heat in the body apparatus upon the periphery induces a pronounced general hyperemia of the skin, and coincidently stimulates the activity of the heart and respiratory centers. Together, however, with the profuse perspiration, the draft upon the general circulation of the hyperemia of the skin, offers the only danger from the administration by leaving too small amount of blood in the larger arteries. Such danger is obviated by keeping the patient in a recumbent position and administering frequent draughts of water during and following the administration.

The *indications* for the employment of convective heat suggested by the physiological effects upon the organism, comprise its application alone or in conjunction with radiant light and heat, the x-ray, or the static or high frequency currents, one or more of them, in the treatment of infectious inflammation, and in the early stage of traumatic or non-infected inflammation, when sometimes better means are not at hand. It is also a valuable factor in association with other measures applied with the body hot air apparatus or light bath for the relief of defective metabolism.

The therapeutics of convective moist and dry heat at the bedside and in many conditions in which other measures bet-

ter adapted are not at hand, is very large and under these conditions is one of the most valuable means at command.

The local use of convective heat is indicated in all superficial inflammatory processes associated with the presence of pus; not in a perfunctory way by the casual application of a hot wet poultice, a hot water bag, or a thick layer of antiphlogistine to be left *in situ* for hours without the application of additional heat, but with strict observance of the temperatures employed and of the time necessary to meet the indication.

(W. B. S.)

(To be continued.)

SOCIETY MEETINGS.

TRANSACTIONS OF THE SEVENTEENTH ANNUAL
SESSION OF THE AMERICAN ELECTRO-THERA-
PEUTIC ASSOCIATION, HELD SEPTEMBER 17,
18, AND 19, 1907, IN COPLEY HALL, BOSTON, MASS.

(Continued from page 642.)

SECOND DAY, SEPTEMBER 18, 1907.

Morning Session.

Meeting called to order by the President.

Communications were read from Dr. Heuel and Dr. Brenne-
man, stating their inability to be present.

Dr. Snow presented the following amendment to Article
32 of the By-Laws: "The following standing committees shall
be appointed annually by the President on the therapeutic ac-
tions and indications and methods of applying the following
physical measures: (1) The Continuous Current, (2) Static
Electricity, (3) High Frequency Currents, (4) Phototherapy,
(5) Hydrotherapy, (6) Mechanical Vibration-Therapy, (7)
Dietetics, (8) Exercise Therapy, (9) Electro-Chemical Sur-
gery, (10) Radiotherapy, (11) Radiography, (12) Thermo-
therapy, (13) Reactions.

"The chairman of each committee and the president *ex-officio*
as chairman shall constitute a committee on research which
shall meet once or twice annually for conference and discus-
sion at the expense of the Association for mileage.

"It will be the further duty of the Committee of Chairmen
and the chairman and members of the respective committees,
and as many of the members who have made valuable research,
to present papers noting the progress of their investigations.
The committee on research shall investigate the reports of the

committees and classify methods of procedure and determine what, in their best judgment, they consider to be laws of preference in therapeutics."

Dr. Snow moved that the incoming president be instructed to appoint the committees embodied in the proposed amendment, and that they be published monthly in the official organ and that they carry out instructions embodied in the proposed amendment. Seconded and carried.

The proposed amendment to Article I.: That the name of the Association be changed to the Electro-Physico-Therapeutic Association, was presented for consideration and the adoption moved and seconded. Lost.

Discussed by Drs. Massey, Nunn, Dickson, Snow, Brockbank, Geyser, Slaughter, Bishop of Harrisburg, Gibson, White, Finkelpearl, Howes, Davis, De Kraft, and Brinkmann.

It was then moved and seconded that a vote in favor of retaining the old name be made unanimous. Seconded and carried.

The following Nominating Committee was then elected: Drs. Morse, Massey, Snow, Granger, Cleaves.

Scientific Session.

Dr. Gibson in the chair.

A paper entitled "A New Method for the Treatment of Pulmonary Tuberculosis," with demonstration, was read by Dr. F. F. Strong, Boston, Mass. Discussed by Drs. Massey, Frauenthal, Bishop, Davis, Shaufler, Humphris, Brockbank, Snow, Gibson, and Barrett.

"Report of 150 Cases of Tuberculosis," by J. D. Gibson, M. D., of Denver, Colo., was read. Discussed by Drs. Kassabian, Snow, and Humphris.

Adjourned.

Afternoon Session.

Called to order by Dr. Gibson.

Discussion of Dr. Gibson's paper was resumed by Drs. Eaton, Dieffenbach, Titus, Frauenthal, Snow, Wright, Kassabian, and Slaughter.

Papers entitled "Lupus of the Nose Requiring Three Years' Treatment with the X-ray Finally Cured," by Dr. C. M. Steele, Oshkosh, Wis., and "Physio-Therapy in Its Relation to the General Practice of Medicine," by Dr. Otto Jeuttner, Cincinnati, Ohio, were placed at the end of the list.

A paper entitled "The Production of Sterility by the X-Ray," by Dr. F. B. Granger, Boston, Mass., was read. Discussed by Drs. Frauenthal, Eaton, Brockbank, Barrett, Pitcher, Dieffenbach, Wright, Titus.

A paper entitled "The Climatotherapy of Tuberculosis," by Dr. Charles Dennison of Denver, Colo., was read by title by the Secretary.

A paper by Dr. Howard Humphris, of Honolulu, title "What is Pain?" was read, and discussed by Drs. Snow, Titus, Bishop, of Washington, Massey, Waite, and Brockbank.

Session adjourned.

Evening Session.

Meeting called to order by the President.

The application of Drs. Ira Prouty and Stephen Birdsall was accepted and they were elected, the Secretary casting the ballot of the Association.

Dr. Moore, Chairman of the Committee on Nominations, reported that the Committee met at the appointed place and the following officers were chosen: President, Dr. H. F. Pitcher, Haverhill, Mass.; First Vice-President, Dr. E. C. Titus, New York, N. Y.; Second Vice-President, Dr. J. D. Gibson, Denver, Colo.; Secretary, Dr. A. C. Geyser; Treasurer, Dr. Richard J. Nunn; Executive Council, Dr. Morris W. Brinkmann and Dr. Chas. R. Dickson.

(To be continued.)

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

A NEW X-RAY TUBE.

Inverse current when present in x-ray tubes will cause the electrolytic decomposition of the platinum on the face of the anode, and aluminum from the cathode, which will be deposited on the inner wall of the glass bulb as an oxide of each metal.

The chemical thus formed absorbs most all of the gas in the bulb very quickly.

After this absorption has taken place the high vacuum offers great resistance to the passage of the current into the tube. At times the absorption is so great that it is impossible to force current into the tube, even though twenty-five amperes are used.

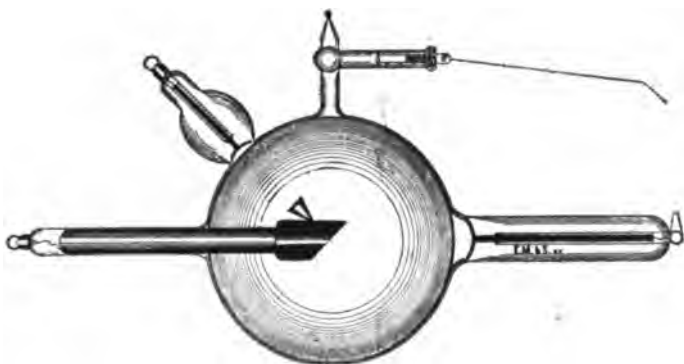
The destructive action naturally shortens the life of the tube, making it impossible to use the tube for either radiographs or for treatment.

If the regulator is used to admit gas into the tube, the same is immediately absorbed, or the vacuum might lower until it shows a red or purple light. After the current has been turned on for a few minutes, the red or purple light will disappear, and a yellow fluorescence will fill the bulb, but no x-rays will be generated; the tube will back up a spark as high as eight inches. This action is due to the presence of platinum and aluminum oxides.

Inverse current is due to change of polarity: i.e., the negative pole becomes positive; the positive pole becomes negative. The change of polarity is so rapid at times that the eye cannot discern the change, but action explained above sets in.

In order to destroy the inverse current when present, and add life to the tube, we have designed the tube shown in the above cut. The anticathode instead of being a flat disk, or an aluminum point, is a regular heavy cathode which converts the negative pole (when on the positive) into a cathode stream.

The cathode stream is focused into the cone attached to



the anode, where it is destroyed without doing any damage to the tube. The following are some of the new features embodied in this tube:

The anode facing of pure platinum.

The improved regulator will lower the vacuum of the tube while in operation to any desired degree. The regulator is so constructed that it cannot puncture.

The cathode stem is entirely free from seal off or regulator, making it convenient to clamp the tube in any position.

On account of the anode facing being of pure platinum, the same can be used several times in new tubes, after the tube becomes used up or broken.

The tube can be used on Induction Coil, Static Machine, and High Frequency Coil.

Manufactured by E. Machlett & Son, 143 to 147 West 23d Street, New York City.

The Journal of **Advanced Therapeutics**

VOL. XXVI.

MARCH, 1908.

No. 3.

THE EFFICIENCY OF THE STATIC WAVE CURRENT IN THE TREATMENT OF SPASMODIC DYSMENORRHEA.

BY EDWARD C. TITUS, M. D., NEW YORK.

Probably there is no class of cases more unsatisfactory to treat by the general practitioner than Spasmodic Dysmenorrhea.

Without attempting to go into the details of the many methods employed, both medicinal and surgical, I will first endeavor to cite the opinions of some of the leading authorities as to the chief causes of this condition, giving their conclusions; and, based upon these and personal experience, the writer's method of relieving this most common and distressing disorder.

It is well known that, during menstruation, there are constant rhythmical contractions of the uterus, which cause no suffering to the healthy woman.

In the neurotic and hysterical subject, though the uterus be normal, these same contractions may become so excessive as to give rise to severe pain, which is most marked if they assume the form of tetanic contractions of the sphincter at the os internum.

Uterine colic is not due, as is generally supposed, to the passage of clots, since in many typical cases only fluid blood escapes from the uterus.

It will be observed that the pain is most severe from twelve to twenty-four hours before the flow appears, instead of on the second or third day, when most clots are passed.

Doubtless the pre-menstrual engorgement of the normal endometrium, and the presence of blood as a foreign body within the uterus, are factors, as suggested by Fritsch.

Sufficient observations have been made to show the incorrect reasoning by which the surgeon infers that, because he finds a slightly deviated, but otherwise healthy, uterus, the dysmenorrhea is due to obstruction of the flow, and endometritis, and that curettement or some other operative measure is indicated.

The same objection holds good to the routine method of treatment in many cases of menorrhagia, in which the results of operation, as shown by its utter failure to relieve the symptoms, go to prove that the cause of the hemorrhage is beyond the reach of surgical procedures.

Many of us have met with obstinate cases of dysmenorrhea and menorrhagia in unmarried women, which, however, have resisted both medical and surgical treatment.

The accepted theory of persistent uterine contractions during the menstrual period may explain the menorrhagia met with in some flabby subjects with general muscular atony. In these cases it is reasonable to infer that the diminution or absence of the normal contractions prevents closure of the blood-vessels, with resultant interstitial changes, pain, and hemorrhage.

Such cases have been diagnosed as "Hemorrhagic Endometritis," and have been treated by so radical a procedure as hysterectomy.

Theilhaber, Menge, Ohlshausen, and others have demonstrated the fact that dysmenorrhea in the majority of cases is not due to disease of the uterus or ovaries, but to the exaggeration of a physiological state in neurotic women.

Dr. H. C. Coe, of New York, very forcefully expresses it when he says that "Surgeons have long been impressed with the fact that the operative treatment of dysmenorrhea is exceedingly unsatisfactory,—the results being either nil, or even injurious,—(in 95 per cent. of all cases operated upon)."

The various medicinal remedies which have from time to time been employed in treating this painful condition are too numerous to mention, and we must not forget the disastrous results of habituation in many cases with which we are familiar.

I think sufficient evidence has been adduced to show that the majority of cases of dysmenorrhea are the result of exaggerated physiological congestion of stasis, and that the symptoms can be classed as due to nerve pressure.

What more potent remedial agent have we for the relief of this congestive condition than the Static Wave Current, when properly applied?

As we now recognize it, the effect of this current is to produce deep, rhythmical, painless contractions through all the structures to which it is applied,—or so-called physiological tissue gymnastics,—even to the ultimate protoplasm, thereby

inducing circulatory drainage and restoration to normal metabolism.

When the writer became familiar with the efficiency of the Static modalities for the relief of congestive conditions,—active and passive hyperemia or stasis,—he began the use of the Wave Current in the treatment of dysmenorrhea, first determining, by a careful examination per rectum, that no distinctive or extensive pathological condition was present.

The uniformly happy results in the treatment of some fifteen cases during the past two years bear evidence of the help the advanced therapist is able to offer this unfortunate class of cases.

My method of treatment is as follows:—

The patient is instructed that, before coming to the office, the bowels should be freely evacuated.

She is then placed in the Sims' position on the reclining (Static) chair, which rests on the regulation platform of the Static machine. This platform should stand about three feet from the machine, and be insulated by glass legs of not less than twelve inches in length.

A suitable metal rectal electrode is lubricated and passed into the rectum, following the curve of the sacrum, so as to have it reach up, behind, and in close contact with the uterus. This can be done without pain or discomfort to the patient. The handle of the electrode may be held by the patient, if instructed, or the electrode may be maintained in proper contact with the internal parts by keeping the handle in position by means of an ordinary wooden tube holder in the arm of the stand which comes with every machine.

The electrode should be connected with the *positive* side of the machine, and the negative side grounded.

Before the machine is started, the terminal or sliding rods should be brought close together (about one-half inch).

After the current is started, the sliding rods should be slowly drawn apart (or the spark-gap increased) until a profound, but not painful, pulsatory sensation is felt by the patient.

At first a spark-gap of not more than two or three inches can be tolerated; but, on subsequent treatments it may be increased to from six to ten inches.

Each treatment should last twenty minutes, and be repeated daily, beginning immediately after menstruation, and continued through the inter-menstrual period.

If, after the first month, it should be necessary to continue treatment, the applications should be made on alternate days.

I have found, in treating these cases, that in frail, delicate women the current from an eight-plate Influence-Wimshurst-Machine was sufficient; while, in more robust and stout patients, the output from a twelve or sixteen revolving-plate-machine was more efficient.

127 West 11th Street.

Discussion.

Dr. Snow: The treatment of dysmenorrhea per rectum renders it so unobjectionable in the treatment of young girls that it seems to me it is something we ought to consider. In my experience I find cases in which there is an organized stenosis are very rare. In forty-three cases which we have treated the results have been successful in forty, and three cases have resulted in failure, in two of which there was an acute ante-flexion and the other one of congenital stenosis. The principle which Dr. Titus has so clearly defined is one of the greatest practicability, and promises more for the relief of the pain and sterility of womankind than any one procedure that has been proposed, and is also devoid of any element of danger.

Dr. Humphris: I have never taken the opportunity to follow up the technic Dr. Titus has given in his paper, but I have for the last three years treated a good deal for chronic constipation by electricity. I think in almost all cases the relief of constipation relieves this painful condition, for patients themselves have volunteered information that they are having painless periods. I think Dr. Titus' paper is to the point and sets forth his technic so clearly that it might well serve the needs of this society or any other medical society.

Dr. Brockbank: This has appealed to me very particularly because of two facts. The first is, I really believe that among women there is prevailing no single condition where we are called upon to treat with an ordinary medical remedy in which the results are so disappointing as in spasmodic dysmenorrhea. I had the pleasure of preparing and reading a paper on that subject at the Medical Association, at Washington, last June, and it seems to me it is a sort of a bugbear with a great many men, but I believe that there is no one condition in which the physical therapist can bring down so abundantly the blessings of suffering women as in the treatment of dysmenorrhea. I have to differ a little from Dr. Snow in his remarks as to the matter of stenosis in cases of dysmenorrhea, however that is not a part of the discussion of this paper. I have a large number of cases of dysmenorrhea caused by stenosis of the internal os. I would like to say that it is unfortunate in my estimation that there appears to be a tendency at the present time to lay the constant current aside. It seems to me the static

currents and other modalities have in a sense overwhelmed the minds of men and they seem to have forgotten the great value of the constant as well as the induced or so-called "faradic" current. . . . Of course it is well in the case of young girls to use the simplest method possible that will give results without having to make a vaginal examination. We all recognize that fact. Nevertheless, when it becomes necessary, and I am convinced after having made the examination as far as I can, I do not hesitate to investigate after taking the patient's family into confidence. Sometimes I make an examination under an anesthetic. I have splendid success by using the faradic current. In a large number of cases I think constipation is one of the principal causes. I find that patients who are constipated suffer from a congestion of the whole pelvic region and painful conditions, sometimes displacements are produced. The static wave current certainly does prove beneficial in these cases by removing the cause.

I refer to one case I had a year and a half ago, a young girl about eighteen years of age, healthy in every way and no organic disease of any kind discoverable. She had suffered for years from painful dysmenorrhea. Her family physician had said to her there was only one thing left to do and that was to operate. She had made partial arrangements to enter a hospital for the operation. Her mother consulted me and I earnestly advised her to go slowly in the matter, and later she brought her daughter for examination. I found she was very much constipated and the pelvic region was sensitive. I began the treatment with high tension induced current combined with vibratory treatment. In a short time she improved and is now healthy. This is only one case, a sample of dozens of others.

Dr. Pitcher: In treating these cases of uterine trouble accompanied with dysmenorrhea we get stasis as the principle cause. Upon examination we find in many cases the uterus tender to the touch and all the pelvic nerves very sensitive. In this condition the wave current rather irritates than relieves. In such cases it is better to begin treatment with the constant current until the sensitiveness is relieved, when the wave current can be used with much benefit.

A girl of twenty years of age came to me complaining of painful and profuse menstruation. She suffered to such an extent that she was obliged to leave her work—which was that of a bookkeeper—for three days every month. I found upon examination a tender, congested uterus, retroverted, and considerably prolapsed. All the nerves and tissues were hypersensitive. She was anemic and her general health poor; she had been treated medically with no result. I began treatment with the wave current, but owing to the sensitive state of the pelvic nerves I was obliged to change to the constant current, with the positive pole in the vagina applied closely

against the uterus; this served to contract the congested tissues and relieve the irritability of the nerves. Then I resumed the treatment with the wave current, gradually increasing the spark-gap to four inches. After three months' treatment the menstruation became nearly painless with much less flow. The congestion and enlargement of the uterus was much less; this, together with the contraction of the ligaments, had caused the uterus to regain its normal position. The patient had gained eight pounds in weight.

Dr. Massey: I was unfortunate in not being present during the reading of Dr. Titus' paper, but I may say that I agree in the main with the points made, as brought out in discussion. Apropos of Dr. Brockbank's remarks, I wish to say that I do not think young girls should be examined unless they show manifest leucorrhea—very decided leucorrhea,—not that which attends anemia, but true mucopurulent discharge. Cases not showing true endometritis are best treated from the rectum by the wave current, or, even by external application of the older modalities. With endometritis present, intrauterine constant current must be used.

As to polarity, this has been hard for me to determine clinically. Usually I prefer the positive pole. If the case is slight, the negative might be best, especially if you want to hasten or increase the flow, and particularly if you give the treatment a few days before the menstrual period. Using the negative, I should employ 25 ma. for four minutes. If there is a very decided leucorrhea, we should give a number of intrauterine positive applications, using a copper sound coated with mercury, properly insulated.

Dr. Brockbank: Dr. Massey did not make any reference to dysmenorrhea. I did not say or did not intend to convey the idea that any other method would not produce the results, that I favored either a vaginal or uterine examination in young girls, but stated that when all other things failed I resorted to this.

Dr. Schauffer: I would like to ask Dr. Titus if he has had experience with high frequency currents instead of constant currents?

Dr. Davis: As I understand the paper, which has been very interesting and instructive, it tells of the treatment of spasmodic dysmenorrhea by one electric modality, and as I have listened to the discussion it seems to me a number of those who have taken part have tried to cover what was best in this paper. If we are to find what is best in the treatment of spasmodic dysmenorrhea, here we have an entirely different subject to deal with. We have got to go into pathology and understand that and understand physiology. What we want to get at in addition to this is the understanding of electricity. We have to understand our electric currents, our modalities which we have to use. Dr. Titus has told us about these things in a

very practical manner. His paper has been to the point and he has told us what he has done and what he is doing. I wish this society might have more of just such papers as he has presented to-day.

Dr. Titus: I feel very grateful to the society for the generous discussion of my paper. I will endeavor to answer them seriatim. I think Dr. Snow's results in some forty-odd cases, are very satisfactory evidence of the efficiency of the static wave current in the treatment of spasmodic conditions due to congestion, and in relieving congestion and stasis. By relieving congestion we relieve pain. You will find that many cases of seeming stenosis are due to this same engorgement. When the engorgement is relieved the seeming stenosis will have disappeared and normal function resumed. One satisfactory part of the treatment is that if women can be convinced of the simplicity of this method of treatment and the lack of indelicacy in its administration, many more will apply for relief of this common condition. The method obviates the necessity of the vaginal examination, objected to rightly by many of our young women. A thorough physical examination can be made per rectum if the patient has been prepared properly, and most if not all pathological conditions can be determined by such a procedure.

I agree with Dr. Massey's statement in his examination of this class of cases and also the avoidance of introduction of any foreign substance within the uterine cavity.

In replying to Dr. Brockbank's method, I fail to agree with him in the use of the direct current in spasmodic dysmenorrhea.

I have found that these cases are more promptly relieved by the efficiency of the wave-current.

Further, as to the statement made by Dr. Pitcher, if he will use the current as described in the paper, I think he will find it can be given. If it is a true case of spasmodic dysmenorrhea, pain will not be felt in its application. As the patient becomes relieved, a greater volume of current can be employed with greater efficiency. In the fifteen cases which I have had the privilege of treating during the last two years, I can state from positive information that in twelve of them no symptom of the pre-existing condition has yet returned. The remaining three I am not in communication with. This is an extremely good result in this particular class of cases.

In reply to the question as to my experience with the high frequency currents, it is the current of high potential and low frequency that I have found to be most efficient in relieving congestion or stasis. I have never felt interested in the employment of so-called high frequency currents but have confined my treatment of these cases to the currents of high potential and low frequency because I wanted to obtain its deep penetrating effects.

HIGH FREQUENCY EFFLUVATION AND SPARKING IN THE TREATMENT OF MALIGNANT TUMORS.

BY DR. J. A. RIVIÈRE, PARIS, FRANCE.

At the present time, when many eminent surgeons acknowledge the efficacy of physico-therapeutics, I wish again to bring forward the propositions I was the first to assert in 1900 and 1903.

Certainly, in spite of the wavering condition of actual therapeutics, in spite of the fatalism existing in the theories on the obligatory increase of malignant tumors, I deem that the cures (pretty numerous), and the numberless very grave cases in which improvement has been obtained by the aid of physico-therapeutics, should make us regard as culpable negligence the fact that no recourse has been had to these agents which pre-eminently have a local and general modifying effect, all the more so because, when in the hands of experienced medical men, they present no danger and give rise to no inconvenience.

On those lines I wish to bring before this Congress a useful contribution by summing up my observations of more than ten years, and to demonstrate plainly at this meeting the results of my clinical experience.

Amongst the physico-therapeutic agents whose action is the most remarkable, I must, above all, point to high frequency and high tension effluves and sparks. The regulation of their activity is pretty easy, according to the case. I preferably employ the long currents and the bipolar sparks when it is necessary to act on tumors deeply situated, reserving for epitheliomata the monopolar applications. At the International Congress of Medical Electricity and Radiology (Paris, July, 1900), I gave an account of my first successes by this method. I mentioned them again in 1903 in a communication to the Academy of Medicine, the importance of which was supported by numerous observations and by the presentation of several patients.

In these communications, where for the first time in radiology the diagnosis was sustained by a histological examination. I was the first to assert that which has since been confirmed—

namely, that the high frequency effluves and sparks cure both superficial and deep malignant tumors; that they destroy the neoplastic masses, whilst they respect the healthy tissues; that their action on lymphoid tumors is most marked; that they should, in conjunction with the Roentgen rays, when employed after operations, serve to prevent the recurrence of malignant tumors; that physico-therapy is the one and only resource in cases of inoperable tumors; that the strength of the Roentgen rays can be very great without producing impairment of the tissues; that occasionally the actinodermatitis seems to hasten and to favor the cure; that it is indispensable to push the treatment as far as elimination of the necrosed parts, then to come back to the general circulation; that the neoplastic cell does not derive any benefit from the synergic forces of the healthy cells under the influence of the nervous system; that it is always necessary to pay great attention to the patient's general condition, as well as to the treatment of the local lesion; that in the presence of a disease as tenacious and grave as cancer, the medical man should know how to accommodate the power of the treatment to the resistance of the disease, and so bring judiciously into play all the resources of the physico-therapeutic armamentarium.

Since that period, without abandoning the use of the Roentgen rays, but faithful to my first convictions, I have within the knowledge of my colleagues, given the first place in treatment to the high-frequency effluves and sparks as being more reliable and more conclusive. However, according to my usual method (which since 1901 I have many times explained to learned societies and also in the *Annals of Physico-therapy*), I regard as legitimate (and going still farther, as indispensable) the therapeutical alternation and superposition of the various physico-therapeutic agents in order to obtain a cure. The medical man, dealing with pharmacology, does he not vary, and at the same time bring together, his authoritative or galenic formulæ? The surgeon, always anxious to carry out antiseptic methods, does he not know how to successfully combine the different resources of *materia medica* so as to multiply the curative action with a minimum of possible inconvenience? In the same way the physico-therapeutic expert should know, when he realizes that the action of one of his

remedies is exhausted, how to have recourse to another in order to perfect a complete cure. (Here we have a point of observation the explanation of which can be found even in the warfare between the cells.) This cure, thus considered, terminates, even in the most hopeless cases, in a lessening of the pain, in resolution of the tumor, in improvement of the dyscrasic condition, in re-establishment of the nutritive equilibrium. I have not thought it necessary to employ chloroform and the curette, as later on my confrère, Dr. Keating Hart, has done. The apparatus I have used, all differing in their mode of production and in their intensity, are the best and the most powerful made up to the present date, and I have always maintained that the patient can bear without pain the longest effluves and sparking on condition that these last are not too strong. Those high-frequency sparks and effluves, the different productive arrangement of which allow of variations in their application, are the ones which exercise an elective action on the neoplastic cell.

Between the spark and the effluve there only exists a question in degree of concentration in the strength of the high-frequency. The effluve is a spark divided into more or less fine rain-like spray; it is emitted from an electrode bristling with points, whilst on the other hand the spark is given off from one point only. The effluves and the sparks, thanks to the perfected apparatus I have made use of, can be short or long, scarce or in large numbers, fine or dense; for this it is merely necessary to alter the working of the apparatus. An even better plan is to have at one's disposal, as I myself have, several apparatus of different construction. There are various shades of dissimilarity between different sparks and effluves, according to whether they are short, fine, long, or dense. The short, warm sparks of great strength are the ones that exercise the thermo-electro-chemical action of which I spoke in 1900. They destroy the neoplastic masses, and their action proceeds from the periphery to the center. These sparks, which are derived especially from the small solenoid or even from the primary part of the resonator, cause pain. The long sparks and effluves act by percussion, and their effect is deep. Their action from a certain distance is necessary for the disorganization of the deep neoplastic cells. The short sparks that are taken up by

the small solenoid act specially by their ampérage. The long effluves or the sparks taken up by the secondary part of the resonator act, above all, by their voltage, which can attain 300,000 volts, or 600 watts. The strength of the transformers, the capacity of the condensators, the relations of the different capacities when brought face to face, the length and the diameter of the conduction wires, are so many factors which intervene to modify the condition of the sparks and of the effluves.

As I have always pointed out, the origin of cancers is comprised in a direct insufficiency of the nervous system at a determinate point of the economy. At this point soon appear unexpected, disorganized cells, wretched waifs that offer a power of resistance absolutely incapable of withstanding the electrical effluves. These last without delay eliminate the neoplasm and at the same time re-establish the nervous influx and the physiological action of the neurons. I may here remark that the elimination is very much more rapid when the cells are denuded, so that the dynamic penetration can operate directly on the very elements of the tumor. The cancer cell is a young cell (even embryonic), containing within itself an inexhausted reserve of the power of evolution. In my thesis (Paris, 1884) I spoke of the force accumulated and condensed in the generative cell, and of the evolutionary force associated with the material (for me the state of condensation of power). Hallion has cleverly put forward the very likely hypothesis that with regard to cancer we have to deal with a cell rejuvenated by abnormal fecundation, and not with a cell that has remained young and that has taken on again (by reason of any application of *vis a tergo*) an evolution which for a long period had been interrupted. This is the karyogamic theory, a rational hypothesis of renovation by conjugation or copulation of fertilizing nuclei. This theory explains the injudicious and ill-timed effort taken on by a species of cell held in "subjection" to try to regenerate itself in the same manner as a species of cell which is autonomous or "free." For this reason the neoplastic cell is much weakened in its resistance. It conducts itself as a veritable pathological sperm, a promoter of tumors, inasmuch as this aptitude of conjugation, this karyokinetic particularity, are pathognomonic of malignant tumors. Unconfined

and absolutely freed as to its direction, thrown out, as it were, the cell becomes the founder of a liberated tribe which renounces, so to speak, all social compact and ignores its previous obligations with regard to the organism. Therefore, as the nervous system no longer directs it, naturally it has a tendency to exhaustion and atrophy (such is the ephemeral existence of protists). All this I have said before, more than twenty years ago, in my works on nevrarchy and nervism.

The ingenious karyogamic theory (supported by Maupas, Fabre-Domergue, and Hallion) explains to us the rarity of cancer at very advanced age, and the pretty frequent etiological rôle played by traumatism, and especially by frequent irritation, in the ordinary proliferation of malignant tumors. By disturbing elementary nutrition we always realize these conditions of imperfect alimentation which, according to Maupas, favor cellular conjugation in the infusoria. I will add that uric acid should also be taken into consideration as a cause of permanent irritation in anatomical elements. It is for this reason that arthritic subjects furnish every day so important a tribute to carcinosis. It is also for this reason that this terrible diathesis presents a development parallel to the curve of the consumption of meat and of fermented or distilled drinks (vegetarians and abstemious people in a large proportion escape the visitation of cancer). High-frequency currents, by preventing the precipitation of urates, by favoring elimination and complete combustion of nitrogenous matter, cut off, as it were, the supplies to the cancerous process, thus preventing the organic cells from taking on karyogamic proliferation, the great abettor of neoplasms and of the most serious neo-organisms.

CONCLUSIONS.

(1) It has always seemed to me that high frequency currents, in the form of effluves or of mono- or bi-polar sparks, enjoy the property of having the most trustworthy, the most continuous, and the most penetrating, modifying action on neoplasms. This observation is the result of experiments and researches lasting over ten years, and my rights of priority in this respect go back to my communication to the Congress of Medical Electrolysis and Radiology (Paris, July 27th, 1900), and to my communication to the Academy of Medicine in 1903.

(2) Nevertheless, one must not be exclusive, and it is our duty to judiciously utilize against neoplasms all the practical agents contained in the physico-therapeutic armamentarium. Roentgen rays, actinism, sparks and currents of static electricity, radium,* ultra-violet rays, ionization, electrolysis,

* With reference to Radium, it is with much pleasure that I recall a conversation I had with my distinguished colleague, A. Darier, on

etc., etc., all furnish valuable and often indispensable help in hastening the cure either by destroying the neoplastic masses, or by strengthening the neurons, or by impelling the neoplastic particles destroyed and carried away by the stream of the circulation to take on the necessary elimination, or finally by bringing back the vital processes to the normal.

(3) The power of the big bi-polar effluves or of the high-frequency sparks is especially more penetrating and more efficacious in the treatment of deep tumors. It is this power that foils with the greatest vigor the whole histogenesis of malignant tumors, and this without the slightest possible suspicion of inflammatory reaction, inasmuch as violet irradiation contains no calorific ray.

(4) It is the karyogamic theory of Hallion (disordered liberation of the cells and fecundation of the embryogenic elements) that best explains the reason my treatment invariably respects the vitality of healthy tissues, and at the same time possesses a kind of elective affinity for the constitutive elements of the neoplasm.

(5) Malignant tumors from their commencement, recurrent tumors and those considered inoperable, are amenable to physico-therapy.

(6) As in 1900 and 1903, I still persist in asserting that large tumors should be removed by the bistoury and treated afterwards by my method to prevent recurrence, and to cure a recurrence should it take place.

(7) Effluviation and the projection of high-frequency sparks should follow all surgical operations on malignant tumors.

(8) With the object of preventing recurrence after cicatrization, a few currents applied periodically, then after intervals, whose lengths should be decided by a medical man, seem to me of paramount necessity.

(9) Physico-therapy, which is the rational method to employ against malignant tumors, constitutes also for them a line of preventive therapeutics.

the occasion of his visiting me in August, 1903, to express his astonishment on finding, when he returned from his holidays, that a patient, who had suffered from generalized lympho-sarcoma, whom he had confided to my care in *extremis* three weeks before, and who had been irremediably condemned by him and by several other medical men, was absolutely cured. I then told him, word for word, that he had before his eyes the result of a combined action of Röntgen rays and high-frequency effluves and sparks, that in 1900 I had spoken of the action of the actinic rays, and that, in my opinion, Radium together with actinic Röntgen rays must have an absolutely certain and positive action on cancer. We went out together to buy some Radium. A little while afterwards, in a very important paper he read to the Academy of Medicine (reported by M. Cornil), he related the case of this patient I had cured by extensive high-frequency effluves and sparks and the Röntgen rays, and he seized upon this occasion to speak of the action of Radium on Cancer.

PHYSIOLOGICAL LAWS RELATING TO THE EFFECTS OF PHYSICAL MEASURES AS EMPLOYED IN THERAPEUTICS.

(Concluded from page 38)

BY WM. BENHAM SNOW, M. D., NEW YORK.

Discussion.

Dr. Bishop of Harrisburg: I would like to say this,—I think the word "law" is too broad and certainly object to it.

Dr. Humphris: When I came to this meeting I had no idea of criticising anything I heard. I live in a little island in the Pacific and only came to learn, and should not now rise to criticise if it had not been for the remarks of Dr. Bishop.. I always look to the American Electro-Therapeutic Association as a fount of wisdom in every branch of electro-therapeutic teaching. Now, I think we will all agree that laws are necessary in every branch of the profession, in every branch of science or art that we or any other people take up, and as I understand from Dr. Snow in his paper he was prepared to suggest laws. As I understand Dr. Bishop the reason for his remarks was, that he thought the society should lay down laws. It would seem to me that if that objection is sustained by the society we should lay down a code of laws. Laws must be necessary for this society, which assuredly is the *ultima thule* of electro-therapeutics in the world. I want to know if that objection is sustained where are we going to find the laws?

Dr. Bishop: From a personal standpoint the law is to govern people, and thus we have power to make that law. We can make from the present conditions our deductions or conclusions, but to say that such a thing is the law is wrong to my mind.

Dr. Titus: I am deeply impressed with the position that Dr. Snow has taken. Many of us, who have been engaged in the employment of advanced therapeutic measures, have heard the discussions at the several meetings of different societies throughout the world, yet the diversity of opinion has left us at sea as to any definite conclusions arrived at in the application of any single modality in the treatment of conditions which we would employ in physio-therapeutic methods. I think from my knowledge of the literature on the subject and my appreciation of the articles that have been presented here, and in different societies in advanced therapeutics that Dr. Snow gives us a clearer conception of a standard of operation, from which we can base our application of physio-therapeutic measures than has ever been given before. He has taken the step forward which few of us have attempted in endeavoring

to establish satisfactory laws and scientific principles for the application of different methods of physio-therapy. It is a satisfaction to know that someone who has had the experience and knowledge of the subject has taken this position, which is, I think, for the first time in the history of this Association. It is an epoch in its history that is marked with decided progressive steps. I thank the writer of this paper for giving us some idea for definite understanding of the application of the different specific modalities in the treatment of the many maladies which we hope will be benefited by physio-therapy. We hear in the discussion of the treatment of one condition such a variety of opinions, such a variety of deductions of the modalities offered, that the satisfaction we now feel in the conclusions adopted by one of the foremost workers we have, encourages us to go on with our scientific work along lines laid down with some definite understanding as to what we are doing.

Dr. Waite: I have listened very carefully to Dr. Snow's paper and was much interested in what is certainly a great advance in electro-therapy.

If we know the pathological condition and we likewise know the physiological remedy, we have in a nutshell the solution of the most intricate medical problems. First, however, we must appreciate to a nicety the pathological condition causing the process, and then we must know the physiological effect of the different modalities of our electrical currents and their effect upon tissue, both sound and diseased. When we know this and use judgment in the selection of our remedy we shall be making great and rapid advances in the science and art of electro-therapeutics.

Right here I might mention that to my mind one of the reasons why greater successes are not more universally reported in the field of electro-therapeutics is because of the lack of uniformity in apparatus. One practitioner may with a certain apparatus report certain beneficial effects while another colleague, presumably employing the same apparatus, in a similar case can render no such glowing report and accords the result in the first instance to the possible fact that the physician had a certain psychic influence over his patient. Careful examination of the apparatus, however, or its method of use would no doubt have revealed sufficient difference to have accounted for the variation in result.

Our friend Dr. Brinkman has a new harmonic coil with which he is working and which can be adjusted to any degree and number of impulses, it being especially adapted for the relief of pain. As this is a unique apparatus Dr. Brinkman is at present the only one working along these particular lines, consequently there can as yet be no exchange of ideas on this subject as applied to this particular instrument.

Dr. Engelman of St. Louis used a high tension coil in his gynecological clinic and reported excellent results therefrom. He published the exact details as to how the coil was made and the method of its employment. Instead, however, of accepting this as a standard and endeavoring to work along the same lines, other physicians had coils made in a slightly different manner to which they proudly gave their names, so that instead of uniformity we have confusion. Instead of following along the path blazed by Dr. Engelman, some thought that if 4,500 feet of wire of a certain size produced a good result, it must of necessity follow that 6,500 feet would do even better, and so a valuable opportunity was lost for making actual comparisons in treatment. It seems to me, therefore, that we will not be able to arrive at any definite conclusions in electro-therapy until we have more uniform apparatus.

We have plenty of means at hand for producing results—our static machines, wave currents with long or short waves, our high frequency currents and our galvanic and faradic apparatus, but until we get some kind of a standard and know just what we are doing and how we are doing it we can never hope for any uniformity in results.

Dr. Gibson: Dr. Snow in his paper brought out this point plainly so everyone could understand and could hear it. The principal point in his paper is to try and lay down laws for the use of all modalities and different treatments. I enjoyed the paper very much and think it is one of the most scientific papers we have ever had and shows a great deal of thought. It is a paper every one of us can read and study carefully, because we know absolutely and assuredly that while patients vary and diseases vary, in electro-therapeutics if we use like methods we get like results so far as electricity is concerned. Let us try continually to get more thoroughly at the cause of our diseases and know more and more about the physical action of the treatment we are using.

Dr. Pitcher: I want to thank Dr. Snow for his paper. Dr. Gibson voices my sentiments, but it would seem to me that if we treat a certain condition or conditions with a certain modality and get a result which relieves those conditions every time, it comes pretty near being a law. You may call it a "law" or use some other word, but it amounts to the same thing.

Dr. Snow is certainly one of our foremost workers in electro-therapeutics, and I read with a great deal of interest his articles and editorials, and I find there is always a good foundation for what he says.

Dr. Brockbank: I have been very much interested in what has been said. I have immensely enjoyed Dr. Snow's paper because I believe it is offered along the right line. It teaches the necessity of understanding not only the disease or condi-

tion with which we have to deal, but to an extent the physical effects and the remedy we have to apply. After all that is the secret of success in the practice of physio-therapy. The trouble is when we do not know why we try to do a thing. The great trouble in literature is that the average writer reports a case either on the presumption of facts or on the assumption that we must necessarily know what the writer was thinking of at the time of writing the article. The writer seems to want to display up to a certain point his knowledge of the subject, yet no one else can understand what is in his mind. I think everyone here will bear me out in that statement. A writer will say he has treated a certain condition and received certain results, but does not say why or how he did so. The physical laws governing and controlling constant currents may be written about. Some fellow who has a similar case buys a battery and goes about to treat his case, goes about the use of the positive pole in the urethra, not knowing what to expect, and you know about what happens, and in a short time he is induced to give it up. They take for granted a great deal is known that is not known. It has been quite plain for a few years that physio-therapy has been taken up in a comparatively systematic way by a number of able workers. Nothing succeeds like success, and many men now begin to realize that those who are working in this, and who have prepared themselves for that work, study and continue to study, day and night, and are doing excellent, honest, conscientious work, and the other one who wants to get in the swim of success goes at it without preparation.

Dr. Snow's paper is valuable in pointing out the necessity of knowing the condition you have to deal with, and understanding the remedy you expect to apply, for in your mind the definite purpose in view is that you are doing a certain thing under a certain condition to produce another certain condition to induce an effect; to change from pathological to physiological conditions, and in order to accomplish that it must be done in a well-defined way. You must apply the modality whether it be of electricity or what not, and the application must be made properly in order to become universal, or we will have no standards. Whether a static machine is made by such and such a firm does not matter. I think the gentleman from Honolulu misunderstood Dr. Bishop entirely. I do not think that Dr. Bishop meant by any means that Dr. Snow was trying to establish laws. Physical laws are fixed conditions, and it is our duty then to be able to apply them and correct any deviation we may find, and bring them back to their normal condition and application. I do not think Dr. Bishop wished to convey the impression that he objected to the knowledge of what physical laws are, but meant the making of laws and determining the methods.

By using a long-continued, universal knowledge this man or that would use a similar modality and knows that he has a definite idea and definite understanding. By doing that we will be able to go forward with a fixed purpose and be able to build up breastworks and stand up against them. We must get back to conditions, and when we have done so we will have some special methods that will be practically used.

Dr. Waite: The doctor referred to the manufacturer. Let me not be misunderstood. This has nothing to do with the matter at all. It makes no difference at all who makes the apparatus. If the practitioner knows what he wants and gives his specifications any manufacturer will make it. I have mentioned Dr. Brinkman's apparatus, but I did not make it; I merely referred to it as something in which he is carrying on special experiments himself. Let me again repeat, given the same specifications for a given apparatus, it makes not the least difference who puts the machine together. The point I wish to make is uniformity in construction of given apparatus—not a corner in the manufacture of electrical supplies.

Dr. Barrett: It seems to me Dr. Snow has come to the point and has tried to tell us that the principal thing was to make our diagnosis or our pathological condition and then learn thoroughly the physiological effect of all electrical modalities and apply our current accordingly. I do not think it is really so much the laws, as it is simply knowledge of those two things. I think this sums up the whole thing.

Dr. Wright: The closer we get to facts, truths, and laws, the less involved and complicated our thoughts and descriptions. A clear conception of anatomy, physiology correct, and physiology erring, which is pathology; a definite knowledge of the laws of the positive and negative galvanic poles as applied to human tissues, simplifies and illuminates modern measures of relief from morbid conditions. For example: a woman suffering from dysmenorrhea consults a general practitioner. Between the Sylla of therapeutic nihilism and the Charybdis of ready-to-drink automatic, shot-gun formulas of commercial polypharmacy, he hands down his selection and fixes the drug habit. Next she goes to the surgeon, who opens the abdomen, does a hysterectomy, the effects of which last for four years. One year suffices for recovery from the shock of the operation, unless the prolonged anesthesia has produced fatal degeneration of some vital organ. With the return of the symptoms, the weary patient consults an electro-therapist, who detects a descent, and enlargement, and tenderness of the uterus, weakened ligaments, and neuresthenia. The positive, galvanic, vaginal, covered electrode, with forty to one hundred or more milliamperes, thrice weekly, relieves the tenderness and enlargement, after which the negative pole *per vaginam* loosens adhesions and the interrupted faradic, fol-

lowed by the Oudin resonator current, by vaginal metallic or glass vacuum electrode for twenty minutes, thrice weekly, makes a new woman of the patient. Thus we reverse the morbid process and, step by step, certainly and steadily approach the physiological condition in which the retaining and supporting muscles, ligaments, and connective tissue resume their functions and are not prevented by too great weight of the uterus. The prescriber of drugs is uncertain as to the patient's idiosyncrasy as to any soothing drug, he is uncertain as to the outcome of the treatment; while the surgeon is more alive to the anatomy than to the physiology of the parts affected, and to the present rather than to the ultimate results of the interference. The electrical method leads from one exact plain step to the next, on to a direct return to the normal condition. The knife is no surer to divide tissues than is the negative galvanic current when desirable. Let the skeptic use the galvanocautery!

Dr. Snow (closing): I did not take Dr. Bishop's remarks seriously. The main intent or idea of my paper was to endeavor to get the trend of thought of this Association turned towards a standardization of therapeutic methods. You may call it law or what you want. Standardization is what we need,—standardization of everything that is included in the scope of physical therapeutics in method and apparatus. There is an incredible amount of next to worthless apparatus now going into the hands of uninformed members of the profession; and if there is anything in the world that this Association should do, that is its duty to do, it is to standardize these things. It never can be done, however, until we get together as a unit and see things in practically the same light. We can try; we can come here year after year and read papers; one on one subject and another on something else; but what we should do is to make an organized effort to adopt standards; and I am going to offer an amendment to-morrow in the executive session to change the names of the standing committees.

My object in writing this paper was to point out certain directions from my own point of view, in the light of my present understanding of the physical and physiological actions of the physical modalities. I have presumed to set up lines of therapeutic indication, and application, which are subject to your approval. Instead of having committees on induction coils, static machines, and apparatus of this kind and that, if we are to have live committees on the various physical measures, the chairman of each should be an active investigator, particularly enlightened, as evidenced by some work done which will qualify him to take his place on the particular committee and insure results. If it be understood by each committee that each year is to be a year of research, and that the respective committees are expected to formulate elementary

and technical methods for general consideration before the research committee of chairmen, and later at the annual meeting to be acted upon and adopted or rejected, we will then have a standardization of therapeutic laws or rules which will constitute a standard of methods that will be invaluable not alone to the membership but to others who are looking to this body for light; for to-day we are the pathfinders.

This is the work of the future, and the members of this Association have a duty, a privilege, and an opportunity to lead the profession to the correct understanding and recognition of physical therapeutics. When the writings of such men as Osler and Sajous indicate the need of a better therapeutics, our mission is evident.

I thank you, gentlemen, for the cordial and considerate discussion of my paper.



CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.

Attending Surgeon, American Oncologic Hospital, Philadelphia.

(Continued from page 88.)

Control of Current.—Cataphoric diffusion of ionized substances is accomplished by the continuous flow of a direct current of sufficient volume, even in the heaviest major applications, and there is therefore no need and no excuse for shocks due to rapid variation of the current. All sudden variations or interruptions of the current are to be carefully guarded against. The only certain way to avoid shocks is the use of an efficient graphite controller of the type long known as the Massey graphite controller. The standard instruments of this type are, however, too small to control currents over 250 milliamperes in strength. For currents over 250 milliamperes we must employ the enlarged Universal Graphite Controller first described in a recent edition of a work by the author.* This instrument (Fig. 7) is manufactured by Otto Fleming of Philadelphia, and the Frank S. Betz Co. of Hammond, Ind. It will permit a current to be turned on in the most

* "Conservative Gynecology and Electro-Therapeutics," by G. Betton Massey, M. D., Fifth Edition, F. A. Davis Co., Philadelphia, Pa., 1906.

gradual manner from zero to 2000 milliamperes, and is therefore not only necessary in the work under consideration but fills all the purposes of a controller for lesser currents, both constant and induced, in ordinary office practice. It is somewhat unwieldy as a portable instrument, but can be readily

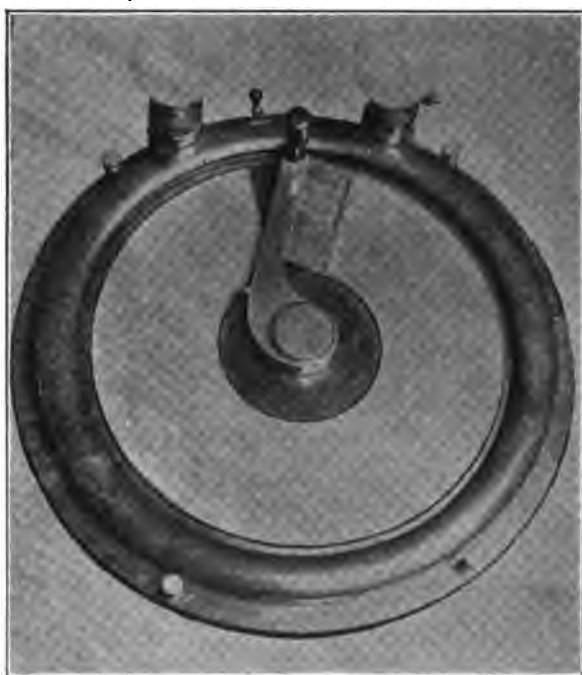


Fig. 7.—Massey Universal Graphite Controller. The lamp to the left is the series resistance lamp; that to the right, the shunt lamp. Both lamps should be used in minor applications. In major operations both are cut out, or turned off.

transported when supplied by the manufacturer with a suitable case.

This latest and most perfect graphite controller has been made much larger than the standard instruments of the last ten years to adapt it for the control of the heavy currents of a major cataphoric application, yet if the graphite coating at the "start" is sufficiently light the initial increase of the current as it is turned on is quite gradual.

A further development of this instrument, made possible by

its ample size, is such an arrangement of the circuits traversing it as will transform it at the will of the operator into a more delicate controller of weak currents than even the small controllers. This is done by cutting down the amperage delivered to it from the mains by inserting a *series lamp* (see Figs. 8 and 9) between the controller and the mains, and a *shunt lamp*

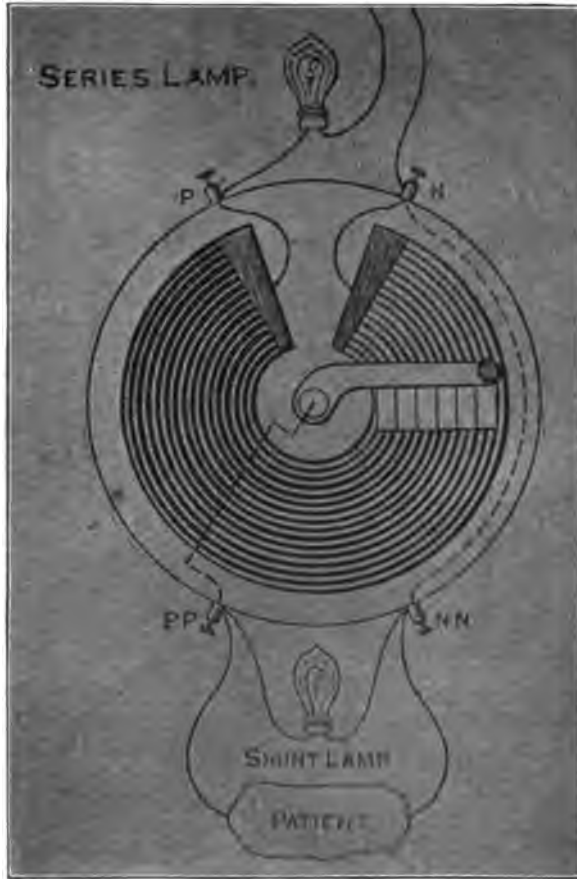


Fig. 8.—Plan of wiring of Universal Therapeutic Controller.

(also shown in Figs. 8 and 9) parallel with the patient, but not in the meter circuit. The result of placing this shunt lamp parallel with the patient is the division of the current delivered by the controller between the lamp and the patient, and as even a 16 candlepower lamp presents far less resistance than

the tissues of the patient, under the usual circumstances, the bulk of the current traverses the lamp and a lesser amount the patient, thus permitting of a most delicate graduation of a minor current and its most gradual "turn on," thus minimizing pain.

A necessary result of this division of current between two paths is the division of the voltage equitably between them.

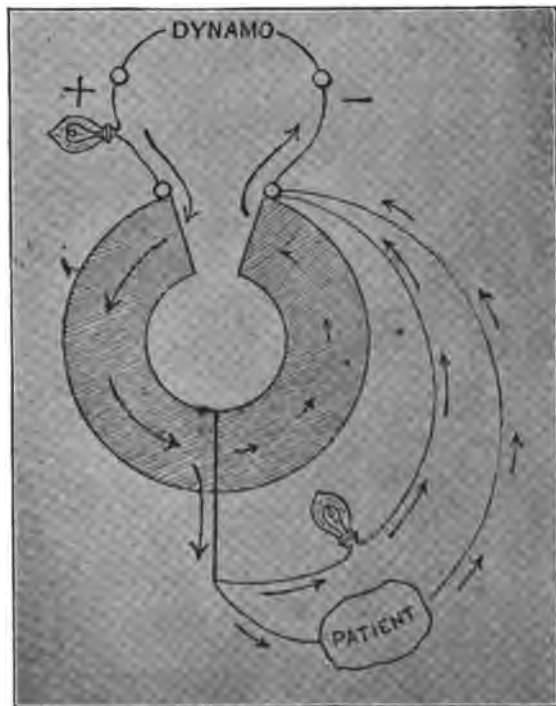


Fig. 9.—Diagram of several paths or "shunts" of the circuit of Universal Graphite Controller. The size of the arrows shows approximately the relative proportions of the current in the several paths, though this varies with kind of application.

The use of such a shunt constitutes the instrument therefore a *volt controller* as well as a milliamperage controller. It is well known that a control of voltage is most desirable when making minor applications in painful situations—that 2 milliamperes, for instance, is less painful from 4 volts than from the whole voltage of the 110 volt circuit.

Besides filling the absolute necessities of a controller for

heavy currents, it will therefore be seen that this instrument has valuable qualities as a general controller of therapeutic currents, and especially the more delicate applications of cataphoresis to painful localities.

This controller is adapted to be used with a battery of dry cells exactly as with the current of the mains. By throwing a portion of the work on all the cells equally it conserves their life and causes equality of wear, as compared with the old-fashioned cell collector, while its gradual variation of the current makes it as essential when employing cells as when using the mains. To use the shunt lamp with cells is nevertheless a severe strain on their lasting qualities. When not in use this controller should always be cut off from the cells by opening a double knife switch.

In using this instrument with the 110 volt current the following variations are possible, giving great range to its capabilities for heavy or fine work:

1. *With both lamps turned off, or "out" of circuit*, it is adapted to control the full 110 volts by mere variation of resistance to produce currents varying from 0 to 2000 milliamperes. This adapts it to heavy current work, and also for the control of induction currents.

2. *With the series lamp*, which is usually placed at the left, turned "*in*" and the shunt lamp turned "*out*" of circuit, the apparatus is more safely placed in the hands of inexperienced persons, as the amount of current delivered through it by accidental short circuit is limited by the resistance of the lamp. This amount may be varied by using a 16 C. P. lamp for lesser currents and a 32 or 50 C. P. lamp for greater currents. The use of this series lamp adapts the controller particularly for the delivery of gynecological currents from the mains, with a range of variation from 0 to 250 milliamperes. The series lamp should not be used when employing a battery of dry cells, or with the induced currents.

3. *With both the series and shunt lamps turned "in" circuit* it is adapted to control the voltage as well as milliamperage, giving a less painful current for the finer work, such as minor applications of zinc-mercury cataphoresis and electrolysis, epilation, etc., and with the lamps in this position the controller will light 4 and 6 volt lamps safely from the 110 volt current.

(To be continued.)

Editorial.

THE SPHYGMOMANOMETER IN DIAGNOSIS.

FROM the most ancient times, the pulse has been considered to varying extents the index of the physical condition of the individual. Before the institution of the use of the clinical thermometer for the diagnosis of variations in the body temperature, and before the days of precision in physical diagnosis, the character of the pulse was considered the most valuable diagnostic sign; and, to-day, the almost habitual practice of taking the patient's pulse as the first step in the routine of examination, is indicative of its significance as showing certain important indications and suggestions for further investigation of the physical condition of the patient. While such recognition should lead the diagnostician to a scientific study of the relative volume, hardness, tension, and other qualities, it is doubtful if any except the most keen and scientific medical practitioners give the requisite attention to the significance of these variations. Indeed, it is doubtful if others form much conception as to its importance except as to the regularity and frequency.

With the march of time and the demand for greater accuracy in determining the quality and character of the pulse, the sphygmograph and sphygmomanometer have come into more or less general use in connection with the more recent study of arterio-sclerosis, and its consideration as the cause or consequence of high arterial tension. Furthermore, the study of auto-intoxication with its effect as probably inducing high arterial tension, has led to a demand for an accurate study of the relative tension as measured by an instrument of precision; and the sphygmomanometer has become in the hands of the scientific clinician, a prerequisite for the study of these conditions. Several types of this apparatus have been devised leading on to the evolution of an instrument of greater accuracy and precision, until at the present time the apparatus in the hands of the profession, for at least relative determination, are very satisfactory; probably as near so as the clinical thermometer.

The early apparatus by which the tension was measured at the finger ends, have been supplanted by the wide band placed about the arm above the elbow, constructed in such a manner that the same pressure that raises the mercury in the registering tube of the receptacle, is equal to that which cuts off the pulse at the wrist, indicating in a scale of millimeters, the amount of the resistance the heart is working to overcome at the time of the examination, as accurately probably as any apparatus that can be constructed for the purpose of measuring the arterial tension. The Rivi Rocca, of English manufacture, was probably the first practical instrument put upon the market; but the American apparatus constructed on the same principles, is equal if not superior to the Rivi Rocca. The use of the device is very simple and the apparatus relatively inexpensive.

There is probably no one addition to the diagnostic armamentarium that has been developed during the last decade which promises more, in the hands of the observing and practical clinician to assist in warding off the development of that scourge of civilized nations—arterio-sclerosis. For now together with this accurate means of determining the condition and character of the pulse as indicating the development of the tendency to this condition, and the employment of the high frequency current—auto-condensation or auto-conduction—and the judicious regulation of diet, for the purpose of regulating the tendency, the scientific physician who studies his cases, is alert in using these prophylactic measures as a prevention of one or another of the later calamities which are otherwise certain to befall numbers of his patients.

* * *

THE STATIC BRUSH DISCHARGE AS A MEANS OF RELIEVING ACUTE INDURATION AND PROMOTING THE HEALING OF ULCERS.

There is probably no simple measure so little appreciated in the hands of many physicians who possess a static machine, as the static brush discharge, as applied with the patient connected to the negative side of the machine with the positive grounded through the medium of a moistened wooden electrode also connected with moist earth.

The fact that this modality applied with the requisite amount of patience and energy will remove the induration and soreness of all superficial inflammation—lines of sutures with delayed union, sprains, injuries and contusions, and the margins and induration of ulcers of the skin or mucous membrane, if appreciated, would lead to the relief and prompt healing without the production of scar of all except malignant, specific infected processes, is the guarantee of those who are familiar with its employment.

Probably no measure associated with the employment of supporting bandages, is so efficient in the healing of varicose ulcers as this modality. The operator should always appreciate the fact that not only the surrounding induration immediately about the margin of the ulcer, but all surrounding induration, should be removed, as it can be, by the patient application of the static brush discharge, to effect a complete recovery and healing over of the ulcerated area with normal skin; the modality meeting three important indications: (1) softening tissue and removing induration, (2) stimulating active metabolism and (3) increasing tissue resistance with a characteristic antiseptic action.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

A Contribution to the Study of High Frequency Currents. By Dr. Foveau de Courmelles. Archives of the Roentgen Ray, October, 1907.

The writer introduces his article with the suggestion that d'Arsonval by means of auto-conduction introduced the use, for therapeutic purposes, of the high frequency currents, and was followed by Apostoli, Oudin, and himself in 1896. [At this point it is only fair to call attention to an error in fact; for at this time it is generally conceded that Dr. Wm. James Morton of this city introduced the use of the high frequency currents in the static induced current.—Editor.] D'Arsonvalization as applied to treatment by auto-conduction, was undoubtedly introduced by d'Arsonval. The apparatus necessary for the administration of high frequency currents consists of

a Ruhmkorff coil, with an interrupter and condensers, two Leyden jars (as first used by Morton with the static induced current), a spark-gap, and a solenoid. The accumulated charges and discharges through the spark-gap and the sudden repercussion by the oscillating discharge, set up surging waves of electricity in the solenoid. The frequency of these alternating waves is some half-million per second, and the patient seated within the solenoid is unconscious of the enormous potentiality in close proximity to him, because their frequency is too high to be appreciated by the senses. They do, however, produce a pronounced physiological effect. By experiments on animals and on himself d'Arsonval demonstrated that they cause a rise of temperature and increase in respiratory changes, augmentation of organic combustion, and temporary elimination of weight with subsequent increase. The pulse is increased in frequency as with the static electric bath. The most profound effect, however, is a pronounced modification of the blood pressure and arterial tension. He calls attention to the fact that no impossible claims are made as to the cure of arterio-sclerosis by this method, and states that with an experience, dating back twelve years, when he described the technique in his book on "Curative Electricity," and when he later defended the methods at the Brussels College of Medical Electricity and Neurology in 1897. As a result of considerable experience he believes that the good effect of auto-conduction depends in the main on its regulating action of arterial tension, the importance of which cannot be exaggerated. It coincidentally stimulates organic combustion with the rise of physiological temperature and in addition increases assimilation and the electro-chemical currents of digestion. The regulating action takes place in conditions of hypertension and also when a hypertension has been followed by a condition of hypotension, on the one hand increasing the arterial tension, giving the arterial blood more force to reach the capillaries in normal quantity, and on the other hand diminish the pressure, thus lessening and softening the circulatory shocks against tissues which are rendered fragile and frail by disease. The author observes that this indeed is not a cure but a very considerable relief in arterio-sclerosis, increasing the strength of the patient, and diminishing his oppression, avoiding and retarding a fatal termination liable to occur from cerebral hemorrhage and may even remedy its effects. In this grave condition it is our duty to call in the aid of all other means, dietetic and medical, as well as d'Arsonvalization, the latter alone being manifestly unable to eliminate alimentary toxins which are the probable cause of arterio-sclerosis if continually renewed in the organism. That it does, however, augment the elimination of such toxins, and improve digestive activity, is proved by the electroscopic observation of the secretions carried out by Thielle and the writer.

The writer has also observed the favorable effects of d'Arsonvalization on syphilitic arthritis and the hemiplegias due to cerebral hemorrhage. The writer considers it absurd to offer amelioration of arterio-sclerosis, if the habits of the patient that have caused it are not changed. Failures with these cases are invariably due to faulty technique; clinical experience and a knowledge of the apparatus being necessary, but not difficult to attain by the earnest student. The writer has employed the method frequently in cases complicated with diabetes and albuminurea with marked improvement in strength even though there is no diminution in the quantity of albumin or sugar. He also observed that in the treatment of obesity the patient is able to tolerate considerable doses of thyroid extract which had previously caused tachycardia and profuse sweating, without these disagreeable symptoms, indicating that the action of the renal filter is increased and the drug more rapidly eliminated. During treatment by auto-conduction there is a marked increase of urea, and the salts of the urine. The thumb apparatus used by the writer for measuring arterial tension has not been altogether satisfactory, but he has later confirmed his results by a more satisfactory English apparatus (probably the Riva-Rocca). The writer's usual séance is one to fifteen minutes, using a current of 6 amperes at 110 volts in the primary, giving from 350 to 400 milliamperes in the solenoid. It is his custom to measure the tension before and not after the séance, and usually repeating the treatment every other day, in this way getting a definite if temporary result; usually getting a regular and progressive alteration of pressure of two to three millimeters of mercury, either increase or decrease according to the case. The number of séances varies, but is usually not less than six, nor more than twelve being required to produce durable results. Advanced cases demand that the séances be repeated from time to time, the results being maintained for only a short time.

Effluviation, the high frequency method introduced by Oudin, consists of a rain of sparks or luminous effluve having an intense chemical and phototherapeutic effect. After Oudin and Boulet, of Paris, studied this subject, Morton has produced almost similar results with his modification of the static sparks—has proved efficacious in cutaneous tubercle, eczema, pruritis, and neuralgia, and is recommended by Doumar for fissure of the anus. Dr. J. A. Rivière, in 1900, drew attention to the efficacy of high frequency effluviation in the treatment of cancer, the utility of which has been repeatedly verified. The writer has also demonstrated and published this method as the ideal treatment of superficial cutaneous chancre, and Dr. Keating Hart has also employed it for the treatment of deep-seated tumors in inoperable cases. After a preliminary operation, removing as much as possible of the dead tissue, the high frequency sparks are applied with great intensity; as they strike

on the tissue they soften it, in such a manner that they may be subsequently readily removed by the current. In cases in which there has been considerable hemorrhage, this ceases almost immediately; in many cases, this alone rendering operation impossible. A current of 250 milliamperes in the resonator will give a series of thin sparks. The handle of the applicator should be insulated and may be hollow so as to allow a current of air to be blown through it by means of a foot-bellows. This serves to cool the instrument and prevent its being clogged by the burnt tissue.

In pulmonary tuberculosis good results may be obtained with the effluve or preferably with a shower of small fine sparks. One case is reported under this treatment in which the patient gained two kilograms of weight in one month, the patient succumbing to the disease three months later.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

So closely do all lines of work touch that it is difficult for the one department not to trespass upon the work of others. The abstract of Schamberg's article which I had prepared for the department of Phototherapy I have laid aside in order to give place to the excellent one made by Dr. Pitcher of the department of Dermatology. The later work of Bernard and Morgan which more than any other definitely placed the bactericidal effect of light seems to have been lost sight of by Schamberg. It has already been reported in the pages of *ADVANCED THERAPEUTICS* and is also permanently recorded in my book on *Light*. Their experiments place the most active bactericidal action in the middle third of the ultra-violet region or in that portion of the spectrum lying between wave lengths 3,287 and 2,265. By their experiments they were led to the conclusion that relatively the action of the other parts of the spectrum is negligible with the activity of this portion. Neither the extreme ultra-violet region nor those nearest to the visible violet region appeared to be active. They also found that light was powerless to destroy bacteria in those cases where the rays were made to pass through any organic substance before impinging upon the bacteria, the thinnest film of agar sufficing to protect the bacteria culture.* There is no ques-

* "Light Energy," Cleaves; Chap. 5, p. 161-203, "The Action of Light upon Bacteria."

tion of killing tubercle bacilli in situ, but the expenditure of light energy which secures an increased resistance on the part of the organism also acts to inhibit their activity.

Just here, judging from many letters of inquiry received from physicians throughout the country, it may be well to reiterate what has been so often said, that incandescent lamps, no matter what their candle power, yield no ultra-violet; for no matter if their spectrum were rich in these rates of vibration the glass enclosing bulb definitely prevents their passage to the external world and hence to patients. The sun at its source is rich in ultra-violet rays, but they are largely absorbed in transit by the atmosphere. It is also rich in the blue indigo and violet which are very active at the earth's surface. The electric arc is a miniature sun providing a constant and very appreciable maximum of blue violet, and ultra-violet energy as well, the action of which can be utilized for localization when passed through quartz lenses. The electric arc is a source of energy par excellence, for securing the maximum of these rates for practical everyday work.

When intense sudatory effects are desired over and above chemical, the incandescent of suitable candle power is indicated. Careful differentiation must be made of conditions to be treated in order to secure the best results. Long-standing and deep-seated lesions which demand the chemical end of the spectrum, for sufficient thermal energy to establish the deep-seated hyperemia required, would prove injurious to the tissue. All manifestations of light do good but the best results are to be obtained by careful differentiation both of the physical conditions and light values.

The present status of light therapy is in no sense different from what it was some three years since. There is a more universal use of this valuable agent, a distinctly better technique on the part of those using it and some improved apparatus. There is need for further study of the physiological action of light as a whole as well as of selected frequencies of the visible spectrum.

(M. A. C.)

The Present Status of Phototherapy. By Jay Frank Schamberg, M. D. From The Journal A. M. A., August 17, 1907. The destructive effect of light on bacteria was proved as far

back as 1876 by two English workers, Downes and Blunt, in an investigation most remarkable for its accuracy of detail. The results were confirmed by the researches of Arloing, of Lyons, in 1885. Numerous investigators, including Finsen, Bang, Bie, Busck, Fround, Strebel, and others, have further proved the bactericidal influence of light.

Bang showed that unconcentrated light from a 30 ampere arc at a distance of 30 cm., will kill a surface layer of tubercle bacilli in six minutes.

The strongest bactericidal sun's rays are absorbed in the air, and thus an arc lamp has been found superior.

Dieudonné observed that bacteria were killed in half an hour by direct sunlight, in six hours by diffused daylight, in eight hours by electric arc light of 900 candlepower, and in eleven hours by the electric incandescent light.

Other investigators have demonstrated that concentrated sunlight will check germ growth in one minute and kill bacteria in from five to seven minutes. Concentrated electric light checks growth of bacteria in from four to five minutes and kills in from fifteen to twenty minutes. Arc light from metal electrodes and the electric spark kill micro-organisms in from five to forty seconds.

Von Jansen demonstrated that a piece of skin inserted between the light source and the bacteria did not prevent their death when the thickness of the skin was 1.2 mm. and the exposure one and one-fourth hours. With 1.5 mm. thickness, bacteria were no longer killed. Bacteria were weakened at a distance of 4 mm. in the tissues:

Busck killed pneumococci inoculated into the cornea of rabbits with light, and Nagelschmid destroyed tubercle bacilli experimentally inoculated into the skin of a guinea-pig.

On the other hand, Klingmüller and Halberstädter claim that the Finsen light does not kill the tubercle bacilli deep in the tissues. They exposed pieces of lupus tissue for ten minutes to the Finsen lamp and then inoculated them into the peritoneal cavity of guinea-pigs. That the bacilli were alive was evidenced by the fact that tuberculosis resulted.

It has been demonstrated that the bactericidal effect of light is largely exerted by the blue, violet, and ultra-violet rays. The most scientific experiments on this point were carried out by Marshall Ward, who broke up light by passing it through a rock-crystal prism and allowed the spectrum to be cast on an inoculated solid culture medium. He found that the bacteria-killing effect began first in the transition between green and blue, and was strongest on the border between blue and violet. Especially when electric light was employed the bactericidal influence of the light extended far into the ultra-violet region. The dominant ability of the ultra-violet rays to kill bacteria, which was first demonstrated by Ward, was independently determined by Finsen three years later.

More recent studies by Bie have established the important fact that the blue-violet end of the spectrum does not exclusively possess bactericidal properties. He says: "I found that with the application of a sufficiently strong light all portions of the spectrum were able to restrain the growth of bacteria or to kill them. The red rays possess the weakest power; this power then increases as one approaches the ultra-violet end of the spectrum, where it is strongest." Four per cent. of the bactericidal effect was ascribed to the red, yellow, and green rays; while the blue, violet, and ultra-violet rays exercised about 96 per cent. of the effect. Red, orange, yellow, and green act only after long exposures. Pure red requires one and one-half hours to produce a determinable effect on bacteria.

Some difference of opinion exists as to the manner in which the tubercle bacilli in the skin in lupus are destroyed. Finsen held that their death is due to the exclusive effect of the ultra-violet rays. Their view is not universally concurred in, many German workers contending that they are destroyed by changes induced in the tissues by the light. Roux established the fact that light exerts an important influence on nutrient media. He showed that Arloing was in error in regarding certain spores treated with light as dead, and proved that they would grow when transplanted to a fresh unexposed medium.

Richardson demonstrated that the sterilization of urine by exposure to light in the presence of air is due to the formation of hydrogen peroxid. Dieudonné confirmed this observation and agreed with Richardson that the ability of light to kill bacteria is due to the formation in culture media of hydrogen peroxid. Kruse, who carried out the same experiments, did not regard the results as due alone to change in the media, but also to a direct action of light on the bacteria. Bie admitted that hydrogen peroxid is formed in many nutrient media on exposure to light, but claimed that bacterial death is more rapid in media in which no hydrogen peroxid can possibly form.

Downes and Blunt early suggested that the destruction of bacteria by illumination depended on an oxidation process and required the presence of free oxygen. Bie's experiments led him to the conclusion that the destruction of the bacteria is not an oxidation process in the sense that the presence of oxygen is a necessary condition. The stronger the light in the blue, indigo, violet and ultra-violet rays, the less does its bactericidal effect depend on the presence of oxygen, and vice versa; the fewer the chemical rays that the light contains, the less able is it to kill bacteria without the aid of oxygen.

The researches of Hertel are most interesting in this connection. Hertel claims that the short-waved rays of light (chemical rays) cause a splitting off of oxygen from the blood and cell plasmas, much in the same way as oxygen is freed from

plants by light, and that this process affects both the tissues and the bacteria.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Recent Advances in the Roentgen Ray Treatment of Disease.

By Walter Berger, M.D., in the Medical Times, October, 1907.

Dr. Berger calls attention to the work of Lehmann and Vorranger and Williams in their experiments with the Roentgen ray and the early diagnosis of pulmonary tuberculosis and calls attention to the fact that the x-ray usually shows clearly the outlines of the disease, as mapped out by physical signs and that it goes a step farther and shows that the disease is usually wider spread than is shown by the clinical symptoms. He thinks that in some cases crepitation and other clinical symptoms may be present and still the x-ray fail to show it, but on the whole he considers the x-ray a very useful adjunct in the diagnosis of tuberculosis.

The editor of this department thinks that these conclusions of Dr. Berger are correct except the last, which he doubts. In other words he believes that any tubercular deposit in the lungs can be shown by the skiagraph before any crepitation is present, and that the crepitant or subcrepitant râles that are heard and of which a skiagraphic shadow, in a properly exposed and developed plate would indicate a bronchitis or asthmatic instead of a tubercular condition. The editor thinks also, after a large experience, including hundreds of cases, that any tubercular lesion of the lungs or glands can be shown in the skiagraph and that it is an invaluable means in determining a correct prognosis in each individual case. This is so self-evident that no argument is necessary; the demonstration being too easy to offer any point for controversy.

In the treatment of sarcoma he quotes Dr. Judd very extensively, claiming that sarcomas should be treated with high tubes from a coil or a many plate static machine and that the tube should be from six to twelve inches spark resistance, by which means an obliterating endarteritis is set up which cuts off the nourishment from the sarcoma, gradually changing it into a fibroma, from which relapses are liable to occur from undestroyed cells, but which will readily yield to the x-ray.

He refers to Pancoast's report of 123 cases of leucemia, which are reported in literature as having been treated with the x-ray. Of these, final reports have been made in sixty-three cases, four of whom are living and well, sixteen have had a symptomatic cure with relapse, but are living, but are now

in a grave condition; eighteen improved, relapsed, and died; five had symptomatic cure with relapse but are living; sixteen showed no effect or were but slightly improved and died; four show symptomatic cure but are still under treatment; only 6 per cent. were well and alive six years after treatment.

Pseudoleucemia—there were forty-one cases of the same reported by Pancoast, the final outcome being known in twenty-nine; sixty-six per cent. were alive and well four years after; thirty-eight per cent. are dead or soon will die, while seven per cent. are still under treatment.

He called attention to a case of menorrhagia caused by a uterine myomata in a patient who was a bleeder. The x-ray was used with this case with very gratifying results, lessening the hemorrhage and also the myomata.

The editor of this department was the first to report a case in which the x-ray was used successfully for lessening uterine hemorrhage in connection with uterine myomata. In this case there was a complication in the form of a large aneurism supposed to be of one of the iliac or uterine vessels, which rendered the case a difficult one for operation and extra-hazardous; and so I used the x-ray in connection with internal electrolysis; and the case improved considerably, but did not entirely recover.

Dr. Berger quotes Feldstein as follows in tubercular glands of the neck: (1) They can be treated by the Roentgen ray when no softening or caseation has taken place. (2) Softened or caseous glands should be referred to a surgeon and ought not to have Roentgen-ray treatment. (3) Post-operative Roentgen-ray treatment is important, if there is any doubt of the remaining glands which might be infected. (4) The Roentgen ray should be used for cosmetic reasons. (5) The size of the gland does not influence the successful result of the treatment.

Treatment of the Tuberculous Kidney by Means of the X-Ray.

N. Y. M. A., January 1, 1908.

Bircher reports two cases in which he obtained favorable results from the methodical use of the x-ray. He recommends this form of treatment for those cases which are not operative, as the patient can lose nothing thereby, but may gain.

X-Ray in the Treatment of Cancer and Skin Diseases. American Journal of Dermatology. By Eugene Hubbell, M.D.

He reports a good many cases of cancer treated by the rays. "Case 1, cancer of the stomach, esophageal opening, male, forty, carpenter, had lost fifty pounds, very anemic, very weak and having to subsist on liquid foods, on account of his inability to swallow solids. It was impossible to pass even the

smallest stomach tube into his stomach. He was put in the hospital and some official work done [not stated what this was] after which he was given x-ray treatments every day for two weeks, then every other day for another two weeks, the exposure being anterior and over the region of the stomach. After a week of this treatment a No. 14 American tube was passed and a quantity of debris was passed from the stomach, which proved to be carcinomatous. At the end of four weeks a full sized stomach tube could be passed and but little blood and debris were washed away. He could eat well, sleep well and walk four miles a day. He returned to his home in spite of all opposition and did well for three months and died of his cancer. Case 2, female, age forty-four, cancer of the stomach, weight reduced to seventy-five pounds, could just move about a little bit. She was submitted to the same treatment as Case 1, with marked benefit. Her weight improved to ninety-eight pounds. She discontinued treatment and after six months began to be troubled again. Treatment was resumed but the x-ray was not able to control the disease at this time. Case 3, bad case of cancer of the breast, finally relapsed and died. Case 4, cancer of the stomach. The X-ray revealed aggravated shadow in the region of the pylorus. After x-ray treatment has now had no trouble in twelve months, but is still kept under observation. Case 5, male, forty-seven years of age, small epithelioma of lower lip, disease reduced to small kernel by the x-ray, which was removed and patient has now been well for four years. Case 9, rodent ulcer on chin. Five treatment caused the ulcer to heal; returned two years later, when it required six treatments to effect healing."

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Treatment of Capillary Bronchitis with Mustard-Water.

Heubner in the *Therapie der Gegenwart* XLVI, No. 1, ascribes a life-saving value to this procedure in many cases of capillary bronchitis where pulmonary circulation and the ingress of air is hindered by the swelling of the mucous membrane and the accumulation of inflammatory products in the bronchioles. The remedy acts by drawing the blood to the surface, thus lessening the amount of blood to be moved and diminishing the obstacle due to swelling of the mucous membrane. He describes his technic as follows: Five-tenths of a kilogram or more of mustard flour are stirred into an open dish containing 1.5 liters of warm water at 40 C. until irritating vapors are given off. (This is a little more than a pound of mustard in three pints of water at 104 F.) A linen cloth

large enough to envelop the child is soaked in the liquid, wrung out, and spread out on a blanket of the same size. The naked child is laid on the mustard sheet, the upper edge on a level with the neck. It is drawn up, and over it the blanket is rapidly tucked around the neck and wrapped around the feet. This pack is left from ten to twenty minutes, according to the vitality of the child. When removed from the pack, the whole body is red. The child is quickly placed in a warm bath or sponged with warm water in order to remove the particles of mustard still adhering to the skin. It is then put in a second pack of lukewarm water and left from one to two hours, if possible, in order to maintain as long as possible the hyperemia of the skin which has been secured. In many successful cases, the child looks like a scarlet-fever patient all day. While in the second pack, the temperature is liable to rise, and the child, therefore, should be under constant supervision, in order to interrupt the process if its head and face become red or as soon as it sweats throughly. A second warm bath is then given, and, in case the child is very hot, cold water may be quickly poured over it. The child is then wiped dry and left undisturbed for the rest of the day. Sometimes the crisis follows, with rapid convalescence, but more frequently a repetition of the process is required on the second or third day or later. It should not be applied, however, more than once in twenty-four hours. This process, like all others, fails in some cases. Where it is not successful in producing reddening of the whole surface of the skin it is better not to attempt to repeat it.

The Influence of Copious Water-Drinking.

Hawk concludes (University of Pennsylvania Medical Bulletin) that copious water drinking causes an increased excretion of nitrogen and phosphorus by the urine. The increase in the amount of nitrogen eliminated is due primarily to the washing out of the tissues of the area previously formed, but which has not been removed in the normal processes, and, secondarily, to a stimulation of proteid catabolism. The increase in the excretion of phosphorus is due to increased cellular activity and the accompanying catabolism of nucleins, lecithins, and other phosphorus-containing bodies. The course of the SO_2 excretion, while somewhat irregular, still showed a general tendency to run parallel with that of nitrogen. The course of the P_2O_5 excretion, as influenced by copious water drinking, was distinctly different from that of nitrogen or SO_2 . In every instance the excretion of P_2O_5 was increased above normal on each day of the water period, the maximum excretion occurring with absolute regularity on the second day of the increased water ingestion. There was a constant tend-

ency for the largest percentage of ingested fluid to be excreted by the urine on the days of copious water drinking.

Cold Affusion in Delirium Tremens.

In delirium tremens Sir W. Broadbent (British Medical Journal, July 1, 1905) strips the patient and lays him on a blanket over a waterproof sheet. Ice water is then dashed violently over the whole body by means of a large sponge, and he is then rubbed dry with a rough towel. This may be repeated two or three times, the patient being also turned over so that the water may be applied to the back of the head, neck and spine. By the time the patient is dried and made comfortable, he will be fast asleep. The cold affusion may even be employed if there is extensive pneumonia with the delirium tremens.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

CHAPTER II.

CONVECTIVE HEAT.

(Continued from p. 113.)

The treatment of an early quinsy or suppurative tonsillitis which may be readily aborted if given proper attention, would go on suppurating with the indifferent use of local heat applications. In tonsillitis some application may be made first as a sinapism for the purpose of inducing a very active local hyperemia, over and around the indurated area, to be removed before blistering as soon as an intense redness is effected. A thin flannel cloth, large enough to cover the spot rendered hyperemic by the mustard, wrung from hot water should be laid over the surface, and over this place a large hot water bag covered with several thicknesses of flannel or a pad made of several thicknesses of flannel as previously described. The hot water bag or heated flannel pads used should be changed as often as necessary to keep the heat at as high and uniform temperature as can be borne. These applications

should be maintained for four or five hours, or until every bit of induration or pain has disappeared. If such applications are made on the first or second day, the effect is abortive and, as suggested above, is explained by the fact that the hyperemia is effected with coincident relaxation of the involved tissues, associated with the presence of a greater number and greater activity of the phagocytes—conditions favorable to the destruction of the germs, followed by the later constricting effect with final resolution of the induration, and removal of every trace of the inflammatory process.

The same effect as in tonsilitis is readily effected in the treatment of *felons* or *whitlows*, by another method. With a cup of water and a pitcher of boiling water at hand, the patient is directed to at first place his finger, out and in, the fluid in the cup until it can be held constantly within the hot water, adding from the pitcher of boiling water from time to time sufficient to maintain the highest possible temperature that can be borne. It is important to keep this up from three to four hours, or until all pain has ceased, and the finger is in a shriveled and puckered condition, repeating the proceeding after several hours, if necessary, until no pain returns. In the early stage when the throbbing and pain are well established, but before much pus is present, this method will invariably abort this painful condition. The same result can be effected with the static brush discharge or the vacuum tube current taken directly from the static machine in from ten to fifteen minutes, and likewise in tonsilitis. (See Static Modalities in Infectious Conditions.)

In the early stage of mastoiditis, or of *furuncles* in the aural canal, or *otitis media*, the surface application of heat in the same manner as in the treatment of tonsilitis and for as long or longer periods of time, when employed early, is very effective in relieving the conditions, though not with such energy and promptness as the application of radiant heat. The same method is applicable to the treatment of boils, furuncles, and other abscesses superficially located.

In inflammatory conditions of the pleural and abdominal cavities, applications of heat on the same principle are very effective, though in deep-seated conditions they will often utterly fail of effecting the desired result.

In pleurisy, applications for from three to five hours with

large surface applications kept as hot as can be borne, a happy result is promptly effected in most cases, and it is a question if many cases of pneumonia may not be aborted by these same early applications of heat in conjunction with other rational procedures. Probably in this case the employment of kaolin cataplasms or antiphlogistine in a thick hot layer placed over the affected area, over which applications of heat is applied to maintain the temperature, is a most convenient and effective means of treatment. It is a striking fact that over some conditions, these preparations, mixed as they are with glycerine, will become dry and hardened, while in others the abstraction of moisture will cause the composition to become thin and volatile in consistence. This is explained from the fact that in severe inflammatory conditions of congestion with impaired secretion, the tissues seem to absorb the glycerine from the compound.

In *peritonitis* and the painful conditions associated with *appendicitis* or other abdominal abscesses, where the weight of the application is an objectionable feature, the application of a sinapism, followed by the flannel cloth wrung from hot water, and the subsequent frequent changing of heated flannel pads, for hours, maintaining as high a temperature as can be tolerated, is indicated. At first favoring a localized active phagocytosis, later followed by the resolvent action and restoration, which is the result which follows superficial pus processes in the abdominal cavity.

Applied for relief of the deeper processes, as demonstrated by Gilman Thompson,* the effects of convective heat are ineffective. Hence the administration of convective dry heat applications is ineffective except in so far as they raise the general resistance by promoting metabolism and general elimination. In such cases, however, the body hot air bath, by employing very high temperatures, offers much; but probably no agent, except the x-ray, which has a potent effect upon pus processes, is more efficacious in deep-seated processes when radiant light and heat focused to small surfaces or applied largely from sources of high candle-power. There is no doubt in the mind of the writer, from his own experience, and the experience of his *confrères*, that radiant light and heat are very effective in influencing deep inflammatory processes in the

* *Thermotherapy*, New York Medical Record, April, 1907.

cavities of the trunk, and are indicated in all such cases, the applications to be made for considerable time, and as close to the source of radiation as can be borne, and frequently repeated until the inflammatory process is abated.

The employment of the local hot air apparatus over inflammatory regions in the *pleural* and *abdominal cavities*, is another efficient method of applying convective heat in these cases. The patient reclining is placed near the edge of the bed, with the side or surface involved directed towards the open side of the apparatus. The surface to be treated is then wrapped with two or three layers of Turkish toweling and the hood of the apparatus is brought to the surface in such a manner as to convey the heat to the affected area; by this means temperatures ranging from 300° to 400° F. may be administered for as long a period as indicated, usually for from twenty minutes to one-half hour.

Another method of employing convective dry heat, in connection with cold applications, will prove invaluable in some subacute inflammatory processes, or abdominal hyperemia, as follows. In congestion of the large glands, the liver and spleen, for example, associated with a low grade general metabolism, the application of heat to the lower portion of the trunk and limbs, by means of several gallons of boiling hot water, in receptacles, wrapped in flannel cloths and placed upon the blankets upon which the patient reclines, and then with all the lower abdomen and lower extremities enveloped in blankets, cold compresses at a temperature of 60° F., and frequently changed are applied over the involved glands. This method will be found also invaluable in cases of reversed peristalsis, when occurring in connection with post-operative vomiting. The happiest result in a condition of this kind was effected in the writer's family at the suggestion of Dr. Morris W. Brinkmann, of New York, and its value, well attested by the prompt relief afforded after three days of stercoraceous vomiting.

The use of hot douches for rectal and colonic flushings, and the treatment of pelvic cellulitis *per vaginam*, is cordially recommended as instituted by Dr. Thomas Addis Emmett,* is a means of conveying convective heat into the cavities of the body, which has proved extremely efficient in the class of cases

* Principles and Practice of Gynecology, 3d edition, page 113.

in which it is indicated. The correctness of the technique employed in these cases is of the utmost importance. (1) It should be borne in mind that the treatment is for the purpose of the convective application of moist heat to inflammatory conditions; (2) that such temperatures should be maintained at as high degrees as can be tolerated (from 108° to 115° F.); (3) that it should be administered to the patient with the hips elevated, with the employment of a proper douche pan; and (4) that the flow should be retarded and the time of the administration be made from thirty minutes to one hour, the quantity of water employed being the secondary consideration, the *time element* and *temperature* being the elements of greatest importance. In congestion associated with infection, a hot douche will prove of the greatest efficiency at the bedside, but will not compare in value with the employment of the static and high frequency currents in the non-inflammatory cases with the static wave current or the direct vacuum tube current in non-infected cases, or the high frequency currents or the x-ray in infected cases.

In cases of general septic infection following a condition of localized infection, the employment of the body hot air applications at temperatures varying from 250° to 350° F., the patient properly wrapped in Turkish toweling, as previously described, offers, we believe, one of the greatest possibilities of controlling those generally fatal conditions of any means yet employed. The light bath employing the combined effects of radiant light and convective heat, from accumulation of heat, in the cabinet, may serve an equal or better purpose in such cases, in accordance with the physiological effects upon phagocytosis and active elimination and stimulation of the reflex centers, all of which tend to raise the opsonic index and increase of the body energy.

The treatment of localized septicemia in the extremities offers an efficient means, and a greater boon to humanity is hard to find than the employment of convective dry heat in these cases, with the proper local apparatus capable of employing temperatures of 200° to 400° F. In these cases it is always necessary to open up and drain all collections of pus, when the subsequent daily applications of dry heat in the manner described will effectually terminate the infectious process in all cases within a few days, three usually sufficing.

In cases of remote acute congestion, as in lesions of the spinal cord, or liver, it may be desirable to stimulate the vascularization of the skin in order to derive as much as possible of the blood from the deep processes, into the skin. In these cases, the employment of the body hot air bath, or at the bedside by placing many gallons of hot water in receptacles wrapped in flannel cloths about the patient in bed and over all placing several blankets, is effective. By this means a temperature of 200° may be maintained for the desired length of time, varying with the conditions under treatment.

The treatment of non-infectious inflammatory conditions, by the employment of convective moist or dry heat, is of comparatively little efficiency except in the early stages of such congestion. While it may relieve pain temporarily by lessening tissue and vascular tension, it will fail to remove the existing condition of *stasis* with the associated tissue infiltration and induration, and consequently fail to effect complete relief of the condition. This has been amply demonstrated in the treatment of synovitis, sprains, and contusions which promptly yield to the administration of the static current. When these means, however, are not at hand, in the early stage of trauma, the judicious employment of heat, preferably dry heat, in connection with strapping, is often effective, but not so promptly.

For defective general metabolism associated with gout, rheumatism, and auto-intoxication—the forerunners of arteriosclerosis,—the frequent administration of convective dry heat or radiant and convective light and heat administrations in the light bath, are measures demanding the most urgent recommendation; for by acting reflexly upon the centers governing the functions of excretion and elimination of the skin, kidneys, and other emunctories, they exercise a most valuable influence in quickening metabolism and promoting an elimination of waste products and toxins from the body, and together with regulated exercise and diet, and avoidance of such things as aggravate the conditions, influence a restoration of the normal physical conditions of metabolism to a degree readily anticipated. Administrations are to be made during the course of treatment, two or three times weekly, for two or three months, or until the conditions of arterial tension and the character of the secretions eliminated, indicate a restoration to

normal of the functions generally. Convective dry heat, or radiant light and heat, always administered in conjunction with auto-condensation, alternated with the constitutional administration of the static wave current, are remarkably efficacious in lowering high arterial tension, and preventing farther destructive or calcareous changes in the muscular coats of the arterioles, thereby warding off or preventing a dangerous degree of arterio-sclerosis.

The above observations are readily appreciated by those who have become familiar with the employment of physical agents, but as will be suggested throughout this series, it is evident to the trained medical mind that the greatest results in therapeutics are to be obtained not from the employment of any one physical agent, but by the intelligent employment of each, in combination with others, when necessary to best meet the indications presenting.

CHAPTER III.

RADIANT LIGHT AND HEAT.

The application of radiant energy to the treatment of disease, has received no little attention from therapeutists during the last decade. More earnest study and investigation of the agents which have always been recognized as essential to life, have resulted in the introduction of therapeutic methods which bid fair to give the various forms of radiant energy rank with the most valuable curative agents. Their skillful employment is fraught with little danger. To effect the best results however in the large class of cases for which they are indicated, a thorough knowledge of the requirements and limitations of technique indispensable.

Radiant energy as emitted from the usual sources includes the transmission of light, heat, the Roentgen ray and the emanations from radium and other radio-active substances through the medium of the ether and air which are capable of setting up responsive vibrations in animal tissue. The effect of the various rates of frequency is normally to induce responses of the organs of special sense; each sense having perception of a wide range of vibration frequencies during health. The pressure sense and sense of hearing respond only

to vibrations of substantial bodies in the form of gases or solids; while radiant light and heat are transmitted through the ether and are of higher frequency and shorter wave length, inducing responses relative to their intensity—of heat, in the terms of degrees, and of light, in terms of color.

The higher invisible frequencies are only manifested by the effects on living tissue, and of fluorescence of substances in which they are capable of setting up in other bodies thus exposed secondary vibrations corresponding with the visible light frequencies. Platino-barium-cyanide and tungstate of calcium respond to the ultra-violet and Roentgen ray frequencies with a clear, nearly white fluorescence and willemite with green. The higher frequencies, to which the senses do not perceptibly respond, are ether vibrations emanating in Nature from the sun or radio-active substances or are produced from high volt electrical sources as the electric arc, and the Crooke's tube, evolving from the former all of the frequencies of light, and also the invisible frequencies at either end of the spectrum—the ultra violet and infra-red-or heat frequencies, and from the latter the various frequencies of the Roentgen ray, increasing as they do in frequency with shortening of wave length as the vacuum of the tube becomes higher.

It is readily appreciated that these various frequencies of ether vibration, affecting as they manifestly do human tissue, induce effects relative to their wave lengths and frequency.

When it is recognized that "heat is an energy of molecular motion with sudden changes of direction and velocity, when the molecules come near enough to one another" it is self-evident that the human body at 98 2-5° F. is a mass of matter in active molecular motion responding to heat, and coincidentally responding to the influences of the other frequencies. Made up of active organic parts each fulfilling a rhythm of its own, particularly the thrill of the cardiac contractions transmitted through the coats of the arterial walls and the complexity of the vibrations of the nervous mechanism, it is manifest that when those functions are recognized to depend more or less upon external sources for their maintenance, that a loss of normal rhythm or lost balance would naturally be restored by re-establishment of the normal rate of vibration from such sources.

In accord with the law of harmony of vibration, it is probable that the tissues attune themselves from a source of mixed vibrations, as of the combined spectral vibrations of radiant light and heat, deriving therefrom by selection the kind of energy which sets up and restores functional activity. While this is true of the light and heat frequencies which are a part of normal living environment, the higher frequencies, which are not essential to health under normal conditions, as the radiations of the Roentgen ray and radium emanations, have a tendency to overwhelm the tissues exerting abnormal inhibitory influences. It is also true that the ether vibrations which constitute a normal environment do under extreme conditions, as of prolonged exposures to the light and heat radiations of the sun, become inhibitory or depressing in their influence upon human life. Under varying conditions it will be then readily appreciated that the judicious employment of the wide range of vibratory radiant energy will be in a large measure capable either of restoring or inhibiting the vibratory energies or activities of the animal organism.

These higher frequencies of radiant energy conserve the chemical actions and the more gross and energetic mechanical agencies, as certain electrical modalities, mechanical vibration and exercise conserve the mechanical demands for relieving stasis and infiltration, and also increasing the activity of the grosser functions of the organism.

From the point of view suggested by the above premises, it will be recognized that the study of the application of these vibratory agents to therapeutics suggests the investigation of the principles of adaptation of external vibratory energy to the restoration of the body, properly sustained, to its normal vibration in all its parts, as evidenced by the revival of health with the restoration of functional activities.

It must always be recognized that while external agents exert temporarily the energy of motion—vibration—a sustaining pabulum or tissue food is essential to its maintenance. These two—*imparted activity* and *nutrition* constitute a *vis-a-tergo* leading to the restoration and preservation of the functional activities.

Radiant light and radiant heat from the same general characteristics, render the actions of the spectral and infra-red,

or heat rays, similar in their effects upon living tissue, and as they are emitted together, and neither is contraindicated, in most cases it is customary to treat of them in unison as radiant light and heat radiations. It should be borne in mind that the *incandescent* or *mercury vapor* lamps or arc lamps, employed with intervening glass screens or glass lenses, cut out or absorb most, if not all, of the ultra-violet frequencies. This, however, is generally desirable because during courses of light treatment with the ultra-violet frequencies included, as when employing direct sunlight or the electric arc, the skin soon becomes tanned; afterwards largely impeding the penetration and consequent beneficial action of all of the light frequencies. The irritating and tanning ultra-violet frequencies seem therefore to be a provision of Nature for protection against overstimulation of the deeper tissues of those who are much exposed to the sun's rays, in the tropics and during the summer in the temperate zones.

Radiant light and heat are usually derived from the same sources and constitute "a form of wave motion projected by the wave motion of the luminiferous ether," and differ only in kind, being capable of conversion one into the other, as light passed through an object which absorbs a part of the frequencies is converted into heat units,—as demonstrated in the passage of light through blue glass. The fact that they are radiated from the same sources and differ only in frequency of vibration and wave lengths with the objectionable higher frequencies cut out indicates their general employment in unison.

(To be continued.)

BOOK REVIEWS.

THERAPEUTICS OF VIBRATION, The Healing of the Sick an Exact Science.
By WM. LAWRENCE WOODRUFF, M.D., Member of The American Institute of Homeopathy, The California Homeopathic Medical Society, The South California Homeopathic Medical Society, Los Angeles County Homeopathic Society, South California Academy of Sciences; Author of "Climatography of the Salt River Valley Region of Arizona." J. F. Elwell Publishing Co., Publishers, 247 South Broadway, Los Angeles, California. Price, \$1.50 net.

The writer of this little book seems to be imbued with the theory of the invariable relation of electricity with atomic vibration as part and parcel of the process.

He proceeds to discuss the theories of J. J. Thomson, Lodge, Stokes and others, to confirm the notion of the electron theory of substance in accord with which all substances possess their own distinct atomic vibration. He cleverly attempts to reconcile these characteristic vibrations of matter to their relative place in organic chemistry, and with a great deal of confidence asserts the relation of drugs and external physical agencies in inducing relative normal processes. The author's views are unique and utopian; for in his own mind he seems to explain the relations of everything in therapeutics and to have reconciled the broad field of the *Materia Medica* and physical therapeutics in accord with atomic vibrations, and closes his volume with a tribute to the "Immortal Hahnemann," as he designates him, and a host of other therapeutists who have gone before. The volume is unique in its theories and assertive in the positive position taken by the writer. It is a departure from the teachings of previous works on the subject.

ESSENTIALS OF MODERN ELECTRO-THERAPEUTICS, An Elementary Text-Book on the Scientific Therapeutic Use of Electricity and Radiant Energy. By FREDERICK FINCH STRONG, M.D., Instructor in Electro-Therapeutics at Tufts College Medical School, Boston. New York: Redman Co., 1123 Broadway. Price, \$1.00 net.

In the author's preface he calls attention justly to the fact that the medical colleges of the country have not given place in their curricula to the modern teachings of electro-therapeutics, which induced the author to produce this work in order that an up-to-date volume might be put into the hands of medical students. He has prepared the work evidently with a great deal of care, devoting chapters to the consideration of the theories of Matter and Force, the Fundamental Laws and Principles of Electro-Physics, Physiology from an Electrical Standpoint, Galvanism, Faradism, Electro-Diagnosis, Types of Static Machines, High Frequency Currents, the Roentgen Rays, Photo-therapy, the Ultra-Violet Ray, and the Therapeutic Use of Ozone.

It is truly remarkable how much sound and practical teaching has been injected into this small profusely illustrated volume of 111 pages. The work treats more largely of the physics and theory of electricity than with therapeutics, and as a work of its kind, is a valuable contribution to the literature of electro-therapeutics.

A HANDBOOK OF SUGGESTIVE THERAPEUTICS, APPLIED HYPNOTISM, PSYCHIC SCIENCE. By HENRY S. MURNO, M.D., Americus, Ga. Illustrated. C. V. Mosby Medical Book and Publishing Co., St. Louis, Mo., 1907.

The writer has aimed in this work to present to the medical profession both the facts derived from personal experience

and clinical evidence, and also given proof of the value of suggestive therapeutics in general practice. The work is the result of the author's own investigations and the study of the subject from leading authorities. He wishes it to be understood that the work is not written especially for the neurologist or psycho-therapist, but for the general practitioner, for which reason he has taken the liberty of reiterating the principles in order that the uninitiated reader might become familiar with the subject. He has devoted chapters to the consideration of Hypnotism and Suggestion, their Uses and Abuses; Various Phases of Personality, Training of the Sub-Conscious Self, the Importance of Correct Diagnosis, the Abuse of Personality, the Therapeutic Importance of Environment, Hygiene, Education, etc.

The book is written in a clear and attractive style with the leading subjects in full-face type. The work may be read and studied with profit and will afford an interesting and practical means of enlightening those who have not given serious thought to this important and entertaining subject.

MATERIA MEDICA AND PHARMACY. By REYNOLD WEBB WILCOX, M.A., M.D., LL.D., Professor of Medicine at the New York Post-Graduate Medical School and Hospital; Consulting Physician to the Nassau Hospital; Visiting Physician to St. Mark's Hospital; Ex-President of the American Therapeutic Society; Fellow of the American Academy of Medicine; Member of the American Medical Association; Vice-Chairman of the Revision Committee of the United States Pharmacopœia, etc. Seventh Edition, Revised. Philadelphia, P. Blakiston's Son & Co., 1012 Walnut St., 1907. Price, \$2.50 net.

In this volume the writer has confined the scope of his work to materia medica and pharmacy, giving full attention to the pharmaceutical preparations, their dosage, and the art of prescribing, after which a description of remedies is given in detail. Therapeutic agents have been divided into two parts, Inorganic and Organic Materia Medica, the general classification adopted being based upon the grouping of the articles according to Chemical and Physiological divisions; and in order to make the book more complete, condensed descriptions of the action and uses of remedies have been included. This work, combined with the other on *Materia Medica and Therapeutics*, a review of which is given below, is calculated to completely cover the subject of *Materia Medica and Therapeutics*. In this work will be found a more complete consideration of the subject of *Organo-therapy* than is to be found in most works on the subject. The work is arranged in attractive, convenient style for reference, and for those who are interested in the general field of drug therapy, will be found a practical text-book.

PHARMACOLOGY AND THERAPEUTICS. By REYNOLD WEBB WILCOX, M.A., M.D., LL.D, Professor of Medicine at the New York Post-Graduate Medical School and Hospital; Consulting Physician to the Nassau Hospital; Visiting Physician to the St. Mark's Hospital; Ex-President to the American Therapeutic Society; Fellow of the American Academy of Medicine; Member of the American Medical Association; Vice-Chairman of the Revision Committee of the United States Pharmacopœia, etc. Seventh Edition, Revised with Index of Symptoms and Diseases. Philadelphia, P. Blakiston's Son & Co., 1012 Walnut St., 1907. Price, \$3.00 net.

In this, the seventh edition of the author's work, the many advances of the subjects treated have necessitated the division into two distinct parts; the first devoted to *Materia Medica* and Pharmacy, and the second to Pharmacology and Therapeutics; teaching first the substance, and then its uses. This volume is unique in having made a classification based upon the particular physiological effect upon which the agents principally act, as Drugs Acting on the Blood, the Cardiac Mechanism, the Skin, Body Heat, Respiration, Nervous and Muscular Symptoms, and Organs of Generation. The work gives a complete list of pharmacopœal drugs and preparations together with unofficial remedies which have been found to be useful. The author has endeavored to give the latest views of the highest authorities upon the subjects treated. The work is written in good style, comprising more than 850 pages, with a very full index, including both the remedies and diseases in one index. The work is highly to be commended as a work of its kind.

SOCIETY MEETINGS.

**TRANSACTIONS OF THE SEVENTEENTH ANNUAL
SESSION OF THE AMERICAN ELECTRO-THERA-
PEUTIC ASSOCIATION, HELD SEPTEMBER 17,
18, AND 19, 1907, IN COPLEY HALL, BOSTON, MASS.**

(Continued from page 115.)

THURSDAY EVENING SESSION (Continued from page 115).

Dr. Snow moved the nominations be closed and the report of Committee on Nominations be accepted. Carried.

On motion duly seconded the Chairman of the Committee on Nominations, Dr. Morse, cast the ballot for the Society, and the gentlemen above mentioned were declared elected by the chair.

The Auditing Committee reported the accounts of the Secretary and Treasurer to be correct. It was moved and seconded the Report of Auditing Committee be accepted.

Following the session a reception and entertainment was

given for the members, exhibitors, and accompanying ladies, followed by a collation.

THIRD DAY, SEPTEMBER 19, 1907.

Executive Session:

Meeting called to order by the President.

It was moved and seconded that the reading of the minutes be dispensed with.

Dr. Snow moved that the adjustment of all the bills be left with the Executive Council. Seconded and carried.

Dr. White: I wish to explain that in hiring this hall it was necessary to pay \$250, which seems a good deal, but it was the only hall in the city that seemed to be adapted to our purposes.

Dr. Brinkman: This matter was reported to the Executive Council and known before the meeting was held, and under the circumstances it was deemed best to take it, and was approved by the Council.

It was moved and seconded that the selection of the next place of meeting be left with the Executive Council. After the matter was discussed at some length the following places being suggested by members: Saratoga, N. Y.; Portland, Me.; Kansas City; Binghamton, N. Y.; Denver, Colo.; New York City; the motion was carried.

On motion of Dr. Dickson, duly seconded, a vote of thanks was extended to the medical profession of Boston, particularly to the Committee of Arrangements who provided such ample entertainment and assisted in making the meeting a success; also to those who contributed to the entertainment, and the members of the press for the publicity given to the meetings.

Dr. Werber offered the following amendment to the Constitution in writing:

"The officers of this Association shall include a Secretary of Information. His duties shall be to solicit information from members of the Association of professional interest to any member, and he shall be the medium of exchange of such information. When desirable, the official organ of the Association shall be asked to publish notices of information requested. The Secretary of Information shall be elected at the same meeting this amendment is adopted. He shall serve the Association three years or until his successor shall have been installed."

Dr. Johnson presented the following amendment in writing:

"Resolved that hereafter all matters of business, except the election of officers, be referred to the Executive Council."

Application for membership of Dr. Wm. Robinson Martin was presented by Dr. Harris, and the motion being made and carried the ballot cast for the Association by the Secretary, and he was declared elected.

*Society Meetings.**Scientific Session.*

Called to order by the President.

Discussion of Dr. Humphris' paper was continued by Drs. Frauenthal, Brinkmann, Brockbank, Dickson, Cleaves.

A paper on "The General Physiological and Therapeutic Action of Hydrotherapy," by Dr. Curran Pope, of Louisville, Ky., was placed at bottom of list.

A paper on "The Cataphoric Treatment of Cancer," by Dr. G. Betton Massey, of Philadelphia, was read. Discussed by Drs. Dickson, Bishop, Gibson, Wright, Snow, Cleaves, Humphris, Brinkmann, Bishop of Harrisburg.

A paper on "The Physiological Actions and Therapeutic Indications of Continuous Current," by Dr. Francis B. Bishop, Washington, D. C., was read by title.

Paper on "Clinical Observations on the Treatment of Prostatitis," by Dr. Black, Hot Springs, Va., was placed at bottom of list.

Paper on "The Efficiency of the Static Wave-Current in the Treatment of Spasmodic Dysmenorrhea," by Dr. Edward Titus, New York, was read. Discussed by Drs. Snow, Humphris, Brockbank, Massey, Troutman, Shauffler, and Davis.

Dr. M. Kassabian, of Philadelphia, Pa., gave a verbal report on "Roentgen Dermatitis." Discussed by Drs. Brigham, Snow, Brockbank, Wagner, Titus, Dieffenbach, Finkelparl.

Session adjourned.

*Afternoon Session.**Executive Session:*

Called to order by the President.

The applications for membership of Dr. Reeves, Dr. Munney, and Dr. Proctor were accepted.

A paper on "Light Modalities of Treatment of Disease," by Thos. W. Brockbank, Germantown, Pa., was read. Discussed by Drs. Finkelparl, Barrett, Massey, Pitcher, Bishop of Washington, Dickson, Snow, Shauffler, Nunn, Brinkmann, Dieffenbach.

Dr. Dickson moved that all further papers be read by title. Carried.

At this time the following report was presented showing the candle-power of the Leucodescent lamp:

ELECTRICAL TESTING LABORATORIES: GENERAL OFFICES AND
LABORATORIES, 80TH STREET AND EAST END AVENUE,
NEW YORK, N. Y.

Reports Nos. 3405 and 3406 Photometric Tests of "Mogul" Lamps, submitted by and tested for Spear-Marshall Company. Order No. 3255.

The Lamp No. 3405 is rated as 500 c.p. at 114 volts. The Lamp No. 3406 is rated as 500 c.p. at 110 volts.

Tests were made to show the value which would approximate the maximum horizontal candle-power value, and also a value which would approximate the minimum horizontal candle-power. The results were as follows:

	No. 3405.	No. 3406.
Volts	114	110
Amperes	11.98	11.82
Watts	1366	1300
Maximum Horizontal C.P.	555	512
Corresponding W.P.C.	2.46	2.54
Minimum Horizontal C.P.	140	129

(Signed) E. FITZ GERALD,
In Charge of Test.

Dr. Brockbank: Owing partially to the stand that we have taken in mentioning no particular lamp or kind of lamp, certain exhibitors at this meeting have felt aggrieved. I gave an opinion based upon the results of scientific knowledge, not based exactly by claims made by firms that are manufacturing lamps, and I expressed here a number of times, as you well know, in all references to incandescent lamps of high candle-power, that I did not believe there was a 500 candle-power incandescent lamp. If what I have heard is true, I am glad to know that it is. I propose on my return to Philadelphia to carry out a systematic and scientific inspection of the subject I have taken up. As I have mentioned no name concerning the matter I shall not reveal the name of the party here. This lamp was examined in the Electrical Laboratory, in New York, September 18, 1907, is of 500 candle-power, 110 volts. (See paper for details of examination as to amperage, etc.)

Dr. Dickson moved that this matter be referred to the Committee on Radiant Energy. Carried.

On motion of Dr. Dickson a vote of thanks was extended to Dr. Brinkmann for the very able manner in which he has presided as Chairman, to which Dr. Brinkmann responded.

Dr. Pitcher was then presented with the gavel by Dr. Brinkmann, the retiring President.

On motion of Dr. Bishop, of Washington, a vote of thanks was extended to Dr. Geyser for his efficient services as Secretary.

A unanimous vote of thanks was extended to Dr. Nunn for coming from Georgia to attend this convention.

On motion, duly seconded, it was voted to adjourn *sine die*.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

ELECTRIC WAVE GENERATOR.

Electricity for the treatment of certain diseases has proven a most effective agent, and wonderful results have been obtained. Various forms of electrical apparatus have each their particular sphere. In order to meet certain conditions and accomplish results that in the past have not been possible, the

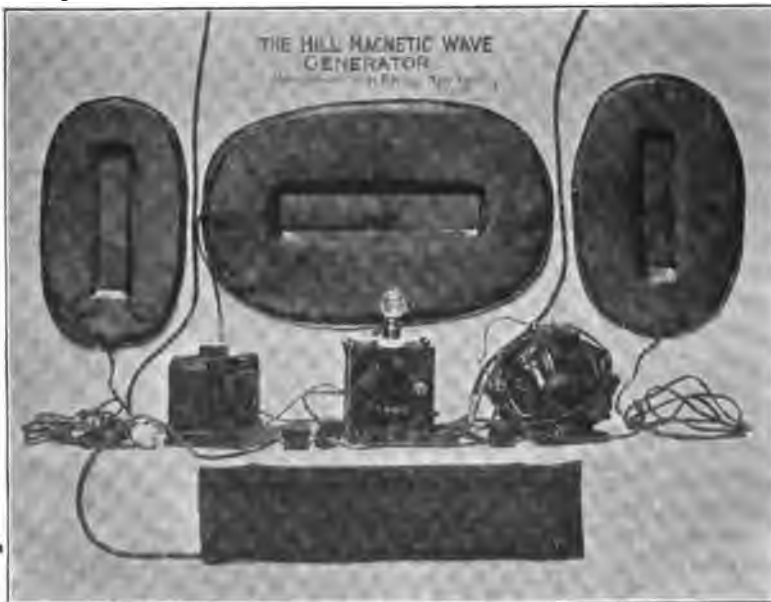


Fig. 1.—Complete Wave Generator Outfit.

Hill Magnetic Wave Generator was designed, and has a particular field to itself. It is not the intention to discuss the therapeutic advantages of the apparatus at this time, and before describing it certain explanations are necessary.

This apparatus must not be confounded with a static machine or the various forms of high frequency currents either from static machines or faradic currents, nor is there any connection between this apparatus and the straight galvanic current as used from batteries. With all the apparatus now on the

market the patient is either in direct contact with the current or is influenced by induction, either static discharges as from static machines, or auto-condensation as from high frequency apparatus. A description of the apparatus is as follows:

A direct current is used, which is converted through a rotary converter into an alternating current. The transformation is generally from 110 or 220 volts direct current into 80 or 160 volts alternating current, and the rotary converter usually operates at 3600 R. P. M., having two poles and giving a frequency of 7200 alternations per minute—60 cycles. For cer-

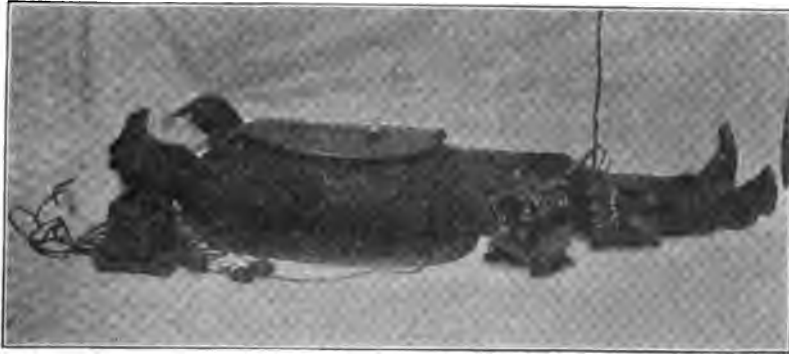


Fig. 2.—Passage of magnetic lines from two fields.

tain treatments the wave generator is connected direct to the rotary converter.

The wave generators, two in number, consist of large coils of insulated wire wound in the shape of a flat coil usually 30 inches long, 18 inches wide, 1-3 inch thick; consumption, 150 apparent watts. This is 80 volts and 1.24 amperes, but as the generator is inductive, the power factor is only about fifty per cent., so that the true watts consumed by each generator are only 75.

For other treatments there is furnished in conjunction with the rotary converter a transformer, which converts an alternating current into a pulsating current. This transformer is 300 watts capacity and consists of a closed circuit, iron core, with two coils wound around the same. One coil is connected in shunt and is wound for 110 volts direct current, and usually consumes 110 watts. By connecting this coil to direct current the iron is magnetized up to the point of saturation, having fixed poles, "N" and "S," all the time. The second coil is connected in series with the rotary converter and the wave generator. Since the iron in the transformer is magnetized up to saturation, its polarity cannot be reversed, and in

consequence of same the effect of the alternating current passing through the series coil would tend to produce a higher voltage at one-half the wave, and to neutralize or reverse the polarity at the other half the wave (sine curve). The effect is that the 80 volts alternating current, 60 cycles per minute, is converted into 115 volts, 30 periods. Since the current cannot reverse, each cycle is divided into 30 periods pulsating current.

The advantage of using the transformer and generating a pulsating current over that of the commutator making and breaking direct current is that by commutation the "choppy"



Fig. 3.—Use of Magnetic Wave Generator from one surface.

effect is avoided, as in order to successfully commutate a direct current it would be necessary to connect a condenser across the terminals to prevent sparking. This condenser would have a tendency to give a leading current or make the break more pronounced.

Diagram No. 1 shows the alternating current wave; diagram No. 2 shows the rectified wave; diagram No. 3, the resultant wave between 60 cycles and 30 periods; diagram No. 4, the electric motive force wave in the blood.

Cut No. 1 shows the apparatus; cut No. 2, the dynamo; No. 3, the transformer; No. 4, the wave generators; No. 5, the Heating Coil which is furnished with the outfit and used principally in diseases of the spine. This coil is 30 inches long, 6 inches wide, and is provided with 1 inch of felt around its edges which fits over the spine. It is provided with a regulating device so that the temperature may be varied, 100, 200 and 300° F. This heat causes an increase of circulation, and with the increase in circulation the spinal cord is nourished.

The apparatus is manufactured by H. P. Hill, No. 1 Broadway, New York City.

The Journal of **Advanced Therapeutics**

VOL. XXVI.

APRIL, 1908.

No. 4.

REPORT OF ONE HUNDRED AND FIFTY CASES OF TUBERCULOSIS PULMONALIS.*

BY J. D. GIBSON, M. D., DENVER, COLO.

Member of the Denver County Medical Society, Colorado State Medical Association, American Medical Association, American Roentgen-Ray Society, American Electro-Therapeutic Association.

Mr. President and Members of the Association:—I need not apologize for bringing before you again the subject of tuberculosis. It is a disease in which no definite specific has been found, though it seems that we are upon the very verge of it every day. Hundreds of physicians and scientists are grappling with the problem, and who can prophesy what will be the result even one year hence? When the specific is discovered, it must stand the test of clinical experience as nothing else can demonstrate its usefulness. It must rise or fall by its clinical ratio, and this will take time. It will be difficult as usual to demonstrate a specific in this disease by clinical means. It is a disease from which patients are so prone to recover that the vast majority of humanity contract it and get well without ever knowing they had had it. Isolated cases can be shown who have gotten well in almost all stages with various forms of treatment, and even without any treatment at all. These isolated cases are not confined to incipient forms, but can occasionally be found among absolutely hopeless cases. Therefore, it will take much time and patience to prove the value of any agent.

One year ago we expected great things from the discovery of the opsonic method by Wright and Douglas, of London, and even hoped that it might lead directly to the solution of the tubercular problem. But, it seems so far to have fallen short of its brilliant promise. In the first place, there is such a thing as opsonins and great variations at times in the phago-

* Read on September 18, 1907, before the American Electro-Therapeutic Association at Boston, Mass.

cytic power of the leucocytes, yet the variations are marked and frequent and affected by so many and various conditions that its value is problematical and very uncertain.

The city bacteriologist (Dr. Mitchell, of Denver) who has just returned from a prolonged stay at the clinic of Dr. Wright, tells me that he did not see a single case of pulmonary or general tuberculosis treated at the clinic while there. The vaccine treatment being confined to localized tuberculosis, as in the glands and the bones, etc.

I, therefore, come before you with a feeling of temerity in making a partial report of one hundred and fifty cases of tuberculosis pulmonalis that have been treated largely by the x-ray, or at least, I consider the x-ray to be the most valued agent used in the treatment of these cases. I will endeavor to classify these cases as they are shown in the skiagraphs, and for the sake of brevity I will report a few cases from each class instead of trying your patience in giving even a brief report of them all.

The method of treatment in these cases has been given you before in several papers. Therefore, I will not take time to go minutely into the treatment. In the first place, these patients are treated by the writer in Denver, and have the benefit of the finest climate the year round in the known world for the cure of tuberculosis. All advantage of this fact is made use of, and to the fresh Colorado air and sunshine is added rest, rest as absolute as is possible to have with each individual patient. He is directed and made to eat food which gives strength and flesh to his weakened frame. To this is added the x-ray for its specific effect on the lungs and germs, and in addition electricity for its tonic properties, aiding digestion and metabolism, and also toning up and strengthening the heart. Ozone nebula is used for its effect on the cough.

In the first class we report twelve cases. You will see by the skiagraph shown that all in this class are mild, incipient cases, cases in which unless there are complications either in the glands of the neck, as in the first cases reported, or some abdominal complication, the x-ray is not expected to do much good, unless it is simply to relieve the pulmonary anemia, thus increasing the resisting powers of the lung and probably increasing the natural immunity.

Case No. 1, residence Omaha, Nebr., young lady, age

sixteen, weight eighty-six pounds, and afternoon temperature 101° F. There were extensive scars on both sides of the neck, showing that surgical methods had been used in removing twenty-eight glands from the neck. The lesion, however,

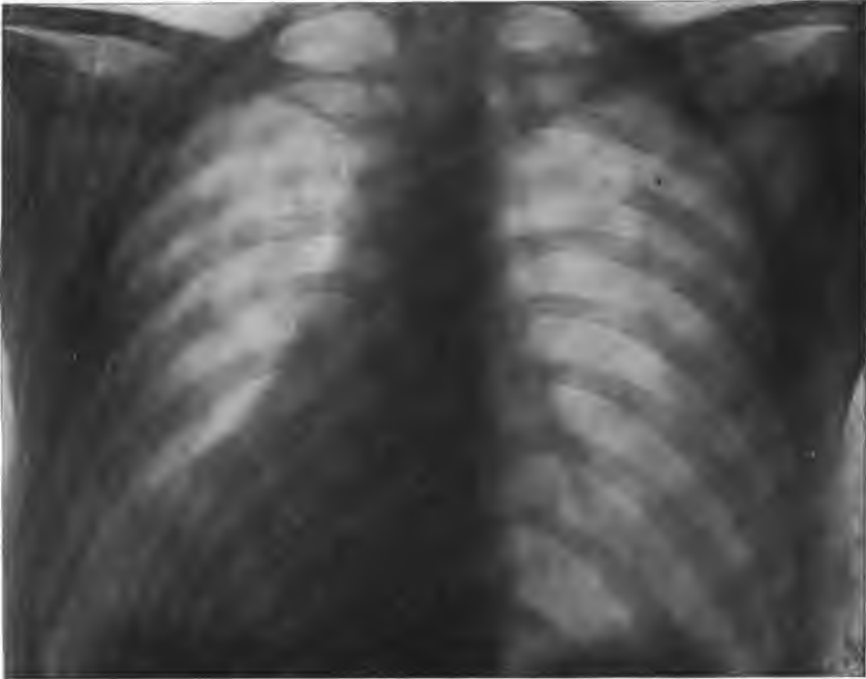


Fig. 1.—Incipient tuberculosis.

returned in a few months and the girl was in bad shape. She was brought to me rather than undergo another surgical operation. There were many enlarged glands on both sides of the neck from ear to clavicle. Sufficient were they to destroy the round contour of the neck, and make it look flat. The skia-graph, Fig. 1, shows the glands in the neck, but the lungs are most normal. However, the apices were rayed regularly with the neck as a matter of prevention. This case has been a success in every way. She has had no treatment now in twelve months, and spent last winter in Omaha, Nebr., and Indianapolis, Ind. Her father wrote me on August 12th last that she "is as well as can be" and is now weighing one hundred and twenty pounds.

Case No. 2, Mrs. R., married, five feet ten inches, and weight ninety-eight pounds, some cough, slight afternoon temperature, very nervous, sent to Colorado with diagnosis of incipient tuberculosis. My diagnosis was, if tubercular it was very slight and the skiagraph, Fig. 2, shows that if there is any



Fig. 2.—Normal lung.

disease present it is very slight indeed. To be on the safe side she and her husband wished her to have the benefit of the x-ray. This patient gained in all about thirty-five pounds before leaving the state of Colorado, more than any other patient of this class, but she had lost more than any other patient of this class. She returned to her home in the east and from all reports is now doing splendidly.

A report of the other ten cases in this class would be a repetition of the above and useless. They are all enjoying good health and none of them are dead or consider themselves sick at the present time.

Class second includes twenty cases. You will note from the

skiagraphs that there is a distinct lesion shown; while not very well marked, they are plainly to be seen, and a step in advance of the cases previously shown.

Case 3, Miss C. H., age about twenty-six, had lost very little flesh, had slight cough, and occasional afternoon rise of temperature. Her general condition was good. A brother was included in group number one and her father in group num-

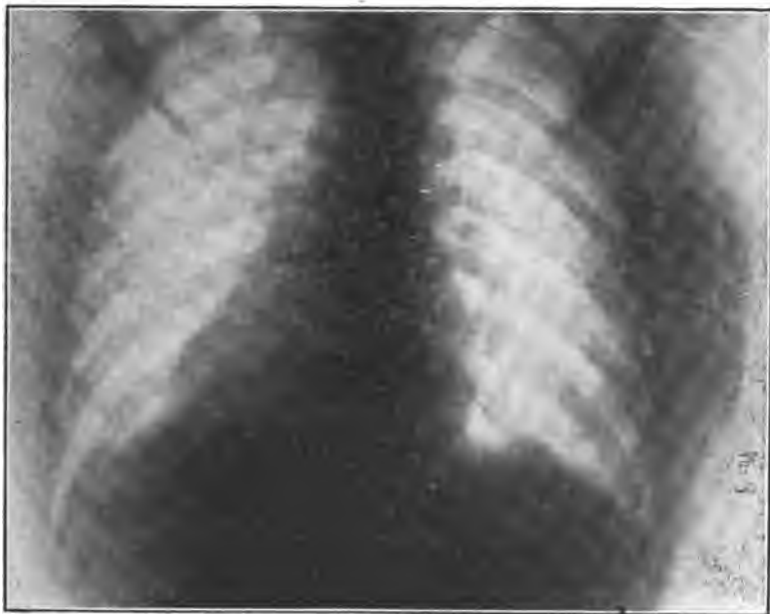


Fig. 3.—Showing thickening of right pleura.

ber five. Her mother and one sister died of tuberculosis. You will note there is a slight thickening of part of the right pleura and a slight darkening of the apices in skiagraph, Fig. 3, not very serious. This patient weighed more than she had ever weighed before when dismissed from treatment, and returned to her home in Texas over a year ago, and now reports herself as "perfectly well."

Case 4, Miss L., shop girl, thirty years of age, Austrian birth, very susceptible to "colds," tickling in the throat at night, slight night sweats, tired easily, finally spit up a little blood, afternoon temperature 100 degrees, cough considerable, but dry. Her weight was one hundred and sixteen pounds and

has increased to one hundred and twenty-six pounds. This girl had to work all of the time during her treatment. She is now, several months after her treatment, symptomatically well, no fever, does her work well without fatigue, and still weighs one hundred and twenty-five pounds, and her cough has disappeared. The condition is shown in skiagraph, Fig. 4.



Fig. 4.—Showing improved condition.

The other eighteen of this class are all living, and consider themselves well, and are at their accustomed avocations.

Class third includes twenty-six patients. The first case I will report under this heading is a case of unresolved pneumonia. I have not shown you a case of this kind before, and it is one that is frequent and cannot be put under x-ray too early.

Case 5, Mr. J. W. H., age thirty-eight years, medium size, white and an American, had been in delicate health for years, but six or eight months before I saw him he contracted pneumonia and failed to get well. After six or eight months he was advised to come to Colorado. He came under my treatment August 4, 1906. He was very weak, but managed to get

to the car and come to the office for treatment. Afternoon temperature 101° F., pulse fast, and more or less trouble with the stomach, weight one hundred and two pounds. The condition is shown in skiagraph, Fig. 5. On the left side the consolidation is shown nicely (bear in mind that the print is reversed and seems to be in the right lung). I consider usually an unresolved pneumonia a tubercular pneumonia. This man gained twenty-three pounds in three months. After

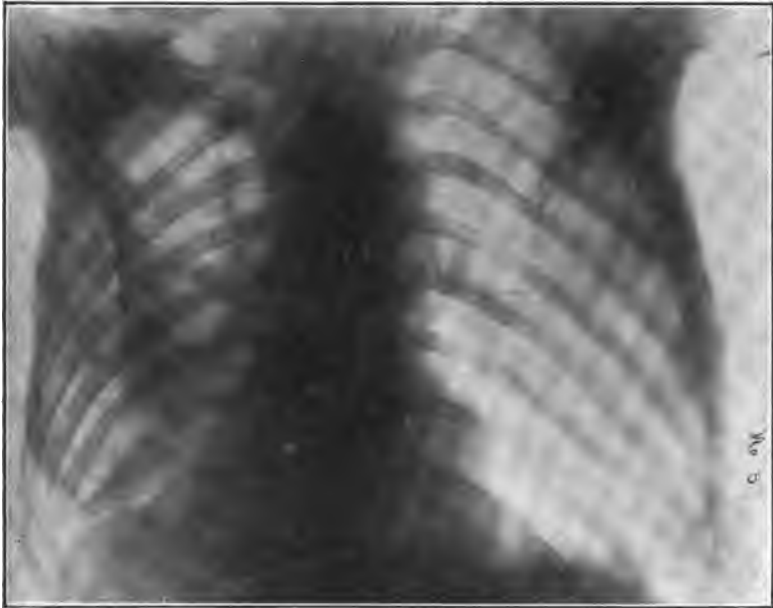


Fig. 5.—Showing consolidation on left side.

resting two months he was given two months more of x-ray treatment, and then allowed to return to his home in Alabama, where he resumed his old occupation, with an increase of salary. His health is at present all that could be desired. His lungs are clear and entirely free from râles. His lung capacity, he says, is about as good as ever and he does his work with as much ease as ever before. This case I think very satisfactory.

This gentleman has a daughter sixteen years old who has tuberculosis also and is under treatment at the present time

and will be allowed to return to Alabama in a few weeks also, as she is progressing finely.

Case 6, Miss C., age twenty-eight years, weight one hundred and thirteen pounds, from Iowa, hemorrhage from the lungs frequent and quite severe, evening temperature 102 degrees, apices of both lungs involved as shown in skiagraph, Fig. 6.



Fig. 6.—Showing mottled condition.

This case, you will note, is a genuine case of tuberculosis of a rather acute, rapidly advancing type of the disease. You will note the mottled, speckled condition. She was placed upon my usual method of treatment for three months. She was then allowed to visit a neighboring town, and two months later was called home to see her mother, who was fatally sick. Her lungs were entirely free from râles and she weighed one hundred and thirty-seven pounds. Her physician wrote me congratulating me upon the result, and said that he considered her completely restored to health.

Case 7, Mr. A. E. D., piano salesman, thirty-six years of age, fairly well nourished, weight one hundred and twenty pounds, afternoon temperature 100° F. Had had several hem-

orrhages, has been confined to his home, and had not been able to work for eight months. The skiagraph, Fig. 7, shows the condition accurately and well. Both apices were filled with râles and extended down to the fourth and sixth ribs as shown in the picture. He was treated for three months, gained twenty-five pounds, fever all disappeared, and he was allowed to go to work at the end of the three months. He has now



Fig. 7.—Both apices filled with râles.

been at work for six months and there is not a râle in his chest. He is holding his weight and is doing splendidly in every way. He reports every month for examination to see if any more treatment is necessary. So far there has been no return and no further treatment has been thought advisable. I think the result is all that could be desired.

Class fourth includes nineteen patients classed under this heading, and it will be noticed that they are more serious cases than those heretofore reported.

Case 8, Mr. T., a young man who spent several years in Asheville, N. C., and the southern part of Georgia for his health before coming to Colorado, where he had been nearly a year

before coming under my care. He had lost weight and had become badly discouraged, suffered a great deal with pleuritic pains, and some rise of afternoon temperature. You will notice the thickened pleura in his left lung in the skiagraph shown in Fig. 8. The thickened pleura is not all of the disease. You

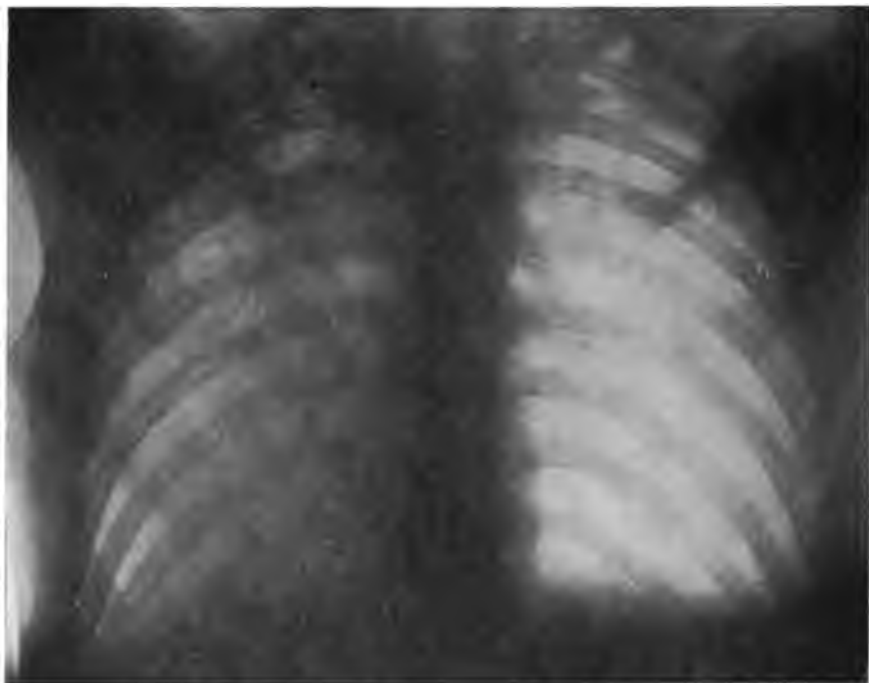


Fig. 8.—Showing extensive tubercular involvement.

will notice by close observation that you get some mottling of the lung behind the pleura. This man's condition, after three months treatment with the x-ray, was so good that he has been at work now for one year, and has required no more treatment, and the prospect is now that he will need no more.

Case 9, Mrs. M. contracted the disease and came to Colorado, and had been in the state about one year before coming to me. She had first gained in weight and then lost, the cough had grown worse, and she and her husband had become discouraged and had decided to return to their home in Indiana, but finally decided to try my method of treatment. You will see by her skiagraph, Fig. 9, that there is considerable consolidation of

her left lung and also at the apex of the right lung. She had chills and fever daily. Her cough was very severe and of course her sputum contained tubercular bacilli. The condition was very bad, but she was treated for three months and then allowed to return to her home in Indiana. Her improvement continued after going home and she gained in weight and strength, while her lungs are entirely well, according to her report, and she is doing as much work and doing it as well

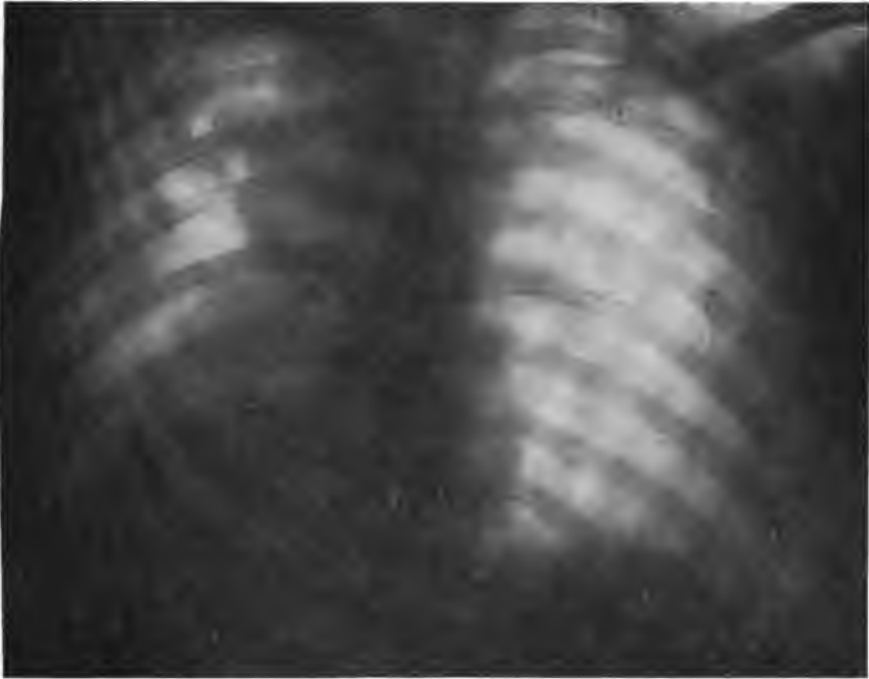


Fig. 9 —Showing marked involvement.

as she ever did. It has been now nearly two years since she returned to her home in Indiana.

Class fifth is a very interesting class. It deals almost entirely with what is ordinarily called hopeless cases, and if my statistics are bad you must remember that every case in this class is far advanced in the so-called third stage. Of course, I have had failures, but this is the most interesting class in the entire paper. Therefore, I will report more cases in this class and go more into the detail of the individual cases. There are

twelve deaths in this class of cases that only had a few days or weeks of treatment on account of weakness and inability to get to the office for treatment. They really have no place in the statistics, as they did not have sufficient x-ray to influence their condition in one way or another. There are seven cases who abandoned the treatment, quitting before the term of treatment expired from various causes, mostly because they did not gain in weight or were not progressing as fast as they desired; leaving of patients who continued through one course of treatment of at least three months in this class, forty-two. Of this number in the last four years there have been five deaths, leaving out of the forty-two cases thirty-seven in which the disease is practically arrested, many of whom are now bread-winners, following their various avocations, while some have not yet progressed so far, but have every prospect of doing so.

I will report two or three of the fatal cases and show you the skiagrams indicating their conditions.

Case 10. The first case I will report is that of A. L. B., male, white, left New Jersey eleven years before coming to Denver. He was a very chronic case in third stage of tuberculosis. He had afternoon temperature of from 101° to $101\ 1-2^{\circ}$ F., was very emaciated, being six feet in height and weighing one hundred and sixteen pounds, cough and expectoration bad, percussion showed flatness, respiration was suppressed and diminished vocal resonance. There was a large collection of fluid in the left pleural cavity, which was beautifully shown in the first skiagram. His right lung, it will be noticed, is badly involved and the only aerated portion shown is in the lower rib spaces of the right lung. In other words, he was living on one-eighth lung power by actual measurement. This patient had a stormy time. After three months the skiagram showed the pleural effusions gone. His temperature was usually normal and his weight had increased to one hundred and thirty pounds. He began treatment in June 1905. His progress was very satisfactory in every way until October 1906, when he was taken violently ill with appendicitis and died in twenty-four hours. He weighed on the day he was taken sick one hundred and thirty-five pounds. At the autopsy his left lung was found to be completely fibrosed and drawn up into the top of the left thorax. The heart was pushed over

and occupied the left lung space. The upper half of the right lung was fastened by adhesions to the thoracic wall. The lower half of the right lung had expanded so as to push the heart firmly up against the little, fibrosed left lung and was dilated so as to fill the lower part of the thoracic cavity, thus supplying pretty good oxygenation until the acute inflammation and rapid distention of the abdominal cavity pushed all of the air out of it and sapped his life in a few hours.

Case 11, Miss W., twenty-four years of age, very weak, weighed eighty-four pounds, had chills and fever daily, usually running from 102° to 103 1-2° every afternoon. She was treated for three months, when she weighed one hundred and two pounds, the fever had disappeared, the cough was better, and the larynx was very much improved from the treatment. She married in the fall of 1906. Soon after she developed appendicitis, and then rheumatism, refused to go to the hospital, where the x-ray could be used, and could not get to my office on account of rheumatism, and so died from exhaustion, January 1907.

Of the other cases, one died from acute pneumonia, contracted from getting up and going to a fire near his home on a zero night.

One other was a miner who had his lungs full of mineral dust to complicate the tuberculosis; and the other was a minister, who did well for eighteen months, and I do not know the particulars of his death.

Case 12, first case of E. S., male, age about twenty-three years. Skiagraph, Fig. 12. He came for treatment in 1905, and has now been dismissed from treatment for over two years. He had been in Colorado about one year before coming under my care. He was apparently well nourished, although he stated he had lost about thirty pounds in weight. His digestion good, but appetite poor, and had an afternoon temperature 101° F. Occasionally he had chills and there was a steady decline in weight. There were large areas of consolidation in both lungs and it seemed that there were crepitant and sub-crepitant râles occasionally present all over the lungs. The skiagraph shows dark shadows in places, even to blackness over the greater part of both lungs. He was treated for two months and then allowed to rest two months and then treated again for two months by my regular method of treatment. The first

months he gained nineteen pounds and in the six months following he gained thirty-eight pounds, which made him weigh eight pounds more than ever before. He is now at his ranch in the country near Denver, doing well, working every day, and no one takes him for a "lunger." His lungs, both of them, are entirely free from râles of any description, but the fibrosis,



Fig. 12.—Showing extensive tubercular process.

in great quantities, is present, giving the characteristic signs, and always will be.

Case 13, Miss M. W., had been in Colorado one year, with steady loss of weight, high fever, chills, night sweats and harassing cough, both lungs were involved, but the stomach and bowels were in pretty good condition. There was no appetite, and an afternoon temperature 102 1-2° F., with a pulse of 120. Streptolytic serum was used to control the mixed infection. Skiagram, Fig. 13, shows the condition very well. You will note the large areas involved in the left lung and the cavity in the center light spot surrounded by a dark ring.

The print does not show the miliary deposits in the right lung, which can be seen in the negative. This patient gained twenty-one pounds, and in spite of many adversities has now returned to her home in Indiana. Now, after several months, she writes me satisfactory reports of her condition. The result in this case, when you consider that we were dealing with an acute condition in the third stage of miliary tuberculosis, is exceedingly satisfactory. The cavity now seems to be entirely healed.



Fig. 13—An advanced tubercular process.

The left lung is completely fibrosed and the right is absolutely clear. She has no elevation of temperature and everything seems to point to her ultimate recovery.

Case No. 15, Mrs. L., wife of a prominent physician, came under treatment in February 1906. Had baby some six months old, after which she developed acute tuberculosis. I first saw her in February 1906, when her temperature was 104° F. and had chills and fever every day. She was very weak and exhausted, but anxious to get well. She was sent to Oaks' Home

and put in Heartsease department, where every care could be given her. Streptolytic serum was given her to control her temperature and it acted charmingly, but after some months the periods of quiescence growing shorter between the recurrences, I became convinced of the necessity of getting the x-ray on her lungs, and so removed her to St. Joseph's Hospital,

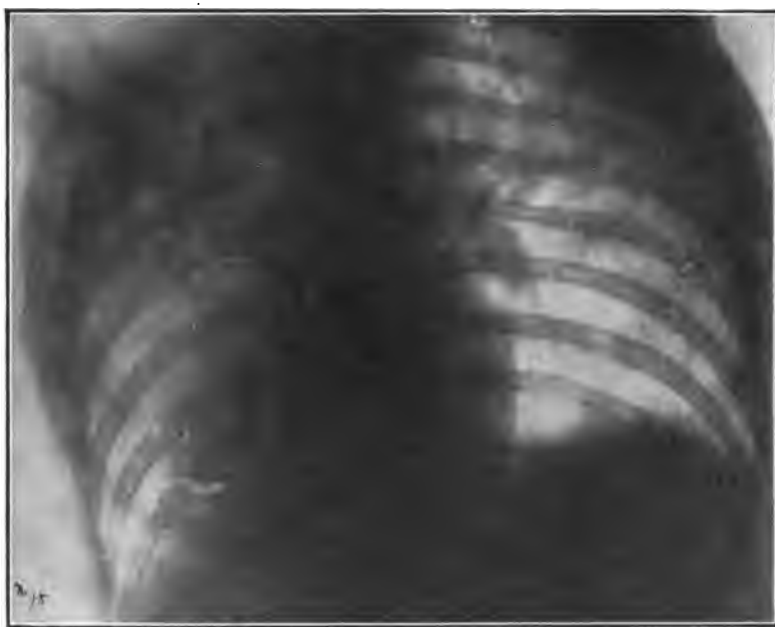


Fig. 14.—Left lung a mass of consolidation.

where I could give her x-ray treatment without her leaving her bed. There was then a rapid improvement, and in one month she began getting out and taking car rides. I then returned her to the Home and she came to the office for treatment. I have had many ups and downs with this patient. You will see from her skiagraph, Fig. 14, that her whole left lung is a mass of consolidation and all through the right lung are interspersed areas of consolidation. The right lung, however, is perfectly clear and apparently in good shape. A cavity developed in the apex of the left lung, but is now healed. The left lung is pretty well fibrosed. She has no fever, and was removed from the Home to a hotel in the city and is doing well in every way.

In concluding this paper I want to emphasize the results

in the fifth class of the cases reported. The cases that died, No. 10 and No. 11, including the cases that died from exposure, with acute pneumonia, and the minister, who had returned to his avocation for eighteen months, were all successful cases so far as their lungs are concerned and would have lived probably as long as if they had never had tuberculosis but for the intercurrent acute affection.

These cases of the fifth class are tedious and slow, but I know of nothing else that offers them any reasonable hope.

Before concluding this paper, I want to call attention to the fact that while I consider the x-ray the most valued of any one agent in treating pulmonary tuberculosis, it will not do everything by itself. There is much to go with it. I believe the climate of Denver helps a great deal. Medicine to aid digestion, tone up the heart, and general tonics are absolutely essential. Antistreptococcic serum in mixed infections are a necessity and collargolum is frequently of use. Electricity can be used to advantage in many ways, and I have demonstrated to my own satisfaction that the ozonized nebulæ is beneficial to the chronic tubercular cough and is an aid in relieving the tubercular patient.

Discussion.

Dr. Kassabian: In radiographing the chest, it is always important to tell the patient to hold his arms over his head, in either ventral or dorsal positions; this is for the purpose of preventing the superimpositions of the shadows of scapulæ over the lung tissue. The negatives of the chest produced by this method will present a clear background for the study and comparison of the lung and other organs. The exposures should be made while the patient is holding his breath in, either after an expiration or inspiration and the plate should cover both pieces.

The technique of these roentgenograms for studying the lung lesion before and after irradiation should be as identical as possible.

I am not using a fluoroscope since six years and wish to discourage every one of you.

In irradiating the chest, care should be exercised to avoid the dermatitis by interposing a sheet of aluminum (1-32 inch thick) and exposures should be made from all directions alternately.

Dr. Snow: I want to commend the writer of this paper on two things in particular. First, on his success in his cases;

and, second, upon the character of his paper. I believe to him, more than any living man, is due the credit of having created a method of treating tuberculosis which promises more than any other for the cure of the great white plague.

His presentation of his cases and results, as well as the lessons taught by his skiagrams, are a wonderful record of the conditions with which he has had to contend and of the results obtained. I am led to believe from my own observations that the action of the rays in these cases is due to direct effect upon the bacilli, inhibiting their activity and preventing their propagation by segmentation, and when in this condition they are readily destroyed by the phagocytes. I believe with Dr. Gibson that the x-ray is the greatest factor in the results obtained in the treatment of his cases, and from results obtained by myself in the treatment of tubercular cases, I am convinced that its place in the therapeutics of tuberculosis will soon be well established.

Dr. Humphris: I think Dr. Snow might have gone a little further when he said that the bacillus was dead after sterilization. It is a question to Dr. Snow's mind and my own as to whether these dead bacilli when sterilized by the x-ray do not act as do the vaccines, which would account for the cure of tubercular glands by irradiation, and also for the variations in the opsonic index with the x-ray treatment of this condition.

Dr. Frauenthal: I have exposed patients as high as three hundred times. I have seen patients repeatedly who naturally recuperate if they become sterile for any length of time, and the power of procreation comes back to them. We cannot compare the x-ray that is placed on seeds and the x-ray placed upon the human body. There are other ways of producing stimulation beside the x-ray. Anything that causes the patient to breathe deep will encourage the lung fibers to contract or improve the stimulation of that part.

Dr. Wright: The *forula cerevisa*, yeast germ, is a natural enemy of the tubercle bacillus. Strain a half ounce of brewer's or any yeast diluted with three volumes of water, and spray the infected surfaces—as the pharynx or skin, and the surface heals in five days or less. The tonsils may be sprayed freely and often as a preventive of their becoming gateways for lung infection. The importance of using a thermometer before and after using the x-ray in treating pulmonary tuberculosis should not be forgotten. The ray through diseased lungs raises the temperature several degrees if continued several minutes. When the elevation is two-fifths of a degree let the patient go home and eliminate the loosened toxins and rest two or four days. Too large a load often depresses the patient.

Dr. Kassabian: I do not think it necessary to protect the heart when exposing the chest. If you irradiate directly over the generative organs there is a possibility of danger of sterility.

In treating the chest or any other part of the body I think sterility will not be brought about.

Dr. Dieffenbach: A few years ago I had a large number of cases of tuberculosis under my observation at the Metropolitan Hospital with x-ray treatment. The results in private practice with x-ray treatment previous to this I think would probably match some of the cases reported. Owing to the lack of co-operation of the men at the hospital the results given in a large number of cases there were absolutely negative, so that we could not draw any definite deductions. In listening to the doctor's paper I was particularly disappointed in not being able to learn his technic or ascertain the principles on which he is treating these patients. At the time when I was using the x-ray in tuberculosis, five years ago, it was stated by some authorities that the x-ray had germicidal action. Others concluded this was not so. Since Dr. Bier's treatment by hyperemia has been found a valuable method for the cure of joint tuberculosis, it has occurred to me that the x-ray might produce this hyperemia and with it an improvement of the general condition. I would like to emphasize what Dr. Kassabian said about the desirability of securing radiographs of the apices. I remember in a number of the doctor's pictures the apex was not shown. In order to show what we are doing with the x-ray it is necessary to show the apices and to take pictures from time to time showing the progress of the treatment. I would like to ask Dr. Gibson if in the treatment of his patients whether the question of sterility has ever come up in the cumulative treatment of this disease. The treatment as I gave it took a number of months, and there is undoubtedly, unless some protection is given, some danger of trouble in that direction, so that unless the patient is protected, some steps should be taken to avoid any such danger. I would like to ask the doctor if he takes particular care to avoid such a danger?

Dr. Eaton: In regard to Dr. Gibson's success in Denver, I presume that the location, the climate, and air would have a very beneficial effect. In my own private practice I have had cases that have been benefited by sending them away to some such place as Colorado or even in the hills of North Carolina and Virginia. I never have believed in the climate of the far South and Florida, but it seems to me that climate and air has a good deal to do with them. It would seem from the doctor's experience and the results of his cases as though there must be some curative effect in the x-ray itself. If that is so and if we have nothing else in all our electrical treatment but that, we have one great boon to mankind. From what I have learned from him to-day I want to begin to make, in a thorough careful way, some experiments. I think in my own practice now I could obtain good results and in a year from this time I hope to report my success.

Dr. Slaughter: In the several cases of tuberculosis in which I have been successful the patients have always come to me suffering from an acute indigestion, and my great fight has been to get rid of the impurities of the body or trying to prevent any getting in. I find it of vast importance to take care of the skin, as well as of the alimentary canal. I think that it is the absorption and reabsorption that keep our patients sick. They have not the resistance necessary to throw off infection. I will give an instance that may explain the condition. A patient came to me with tubercular trouble. The older brother had died the December previous of tuberculosis after having traveled from Denver to Florida without any benefit. He came home to die. This brother became infected, and in June he was apparently beyond help. This condition I think was due to congestion of the lungs and a hyperemia. I used body hot air administrations, and found that the tightness of the chest was relieved and the treatment gave him a great amount of comfort. The x-ray I used first on the chest and then on the back on alternate days. I want to say that at the end of two months he went from me practically well. He is well to-day in spite of the fact that for a time after there was a certain amount of cavity in the lungs. My curative method was to keep his alimentary canal well and give him exercises of the lung twice a day.

Dr. Titus: I hope I may add something of an illustration in the treatment of pulmonary tuberculosis. In the experiments in which I had a part, the result of which was given in a paper before the Society two years ago, I think there was established the fact that the x-ray exerts a decided inhibitory action upon the enzymes of the human body, this action being more manifest upon tissues of lower vitality. From this we may assume that the action of the x-ray on tubercular bacilli is to arrest its propagation. The illustrations which Dr. Gibson has employed show the increase of normal metabolism and verify the effects which have been produced upon the pulmonary tissue.

Dr. Gibson: I am very much obliged for the generous discussion of my paper and will be as brief as I can in replying. My treatment is to put the patient upon the table thoroughly protected, except over the lungs. The cases are treated alternately every other day back and front, making a four-day interval between exposures of each surface. The most beneficial influence in the whole treatment is the kind of apparatus used. I want a coil capable of carrying a great deal of current through the primary—the more the better. The static machine is not worth a cent for these cases. You want plenty of volume and a tube of low vacuum,—no high tubes,—a tube that will take a good skiagraph of the chest in twenty-five or thirty seconds. You want to get penetration into the deep tissues instead of into the skin. I never have any bad burns,

and probably after three months' treatment, by the time I get through with a patient, he will have a brown tinge beginning to show back and front, but nothing that will give any trouble. The first four weeks, as a rule, I notice some improvement, but no diminution of the râles. You will hear as many at the end of four to six weeks as at first. After the sixth week I expect them to disappear. After the sixth week you will get most marked benefit from the x-ray, the râles will disappear and at the end of three months will be gone.

In the third class of cases the cough has disappeared absolutely, not a râle can be found at any part of the lungs, and there will be no finding from a bacteriological examination.

The x-ray will not tell you whether you have an active condition or a fibroid condition. It tells you nothing about the activity of the disease. You get that from the physical examination or other symptoms. The ozone has a great effect on the cough. It eases and soothes it and the patient coughs less. It also improves the condition of the bronchial tubes.

I will state that the time of each exposure in applying the ray should be about ten minutes.

(It was suggested that as this is a subject of great importance, at least four members who are familiar with it present papers at the next meeting.)



ELECTRICITY, A RATIONAL CURATIVE FACTOR.

BY DR. WILLIAM S. WATSON, NEW YORK CITY.

Member of the French Société d'Electro-Thérapie, American Electro-Therapeutic Association, etc.

"Why we use electricity therapeutically?" Simply because it is invaluable. Those of us who are endowed by nature with sufficient liberality (broad-minded enough) to bring to our aid any means that can possibly benefit suffering humanity, those of us who have kept pace with the times, with the various means that have been devised during the past decade for the introduction of electricity by men of such unquestionable sincerity and ability in our own country and those of other lands, as Drs. Anstie, Erbb, de Arsonval, Apostoli, Williams—our own Drs. Massey, Morton, Monell, Newman, Snow, Gottschalk, Herdman and others. It is hardly credible that one doubting Thomas could be found, yet it is lamentably true.

There are still men who are entitled to be called doctors who ignore all that has been said and done by such men as we name and hundreds of others all over the land; men who still insist that there is nothing tangible, no fixed therapeutical value attached to electricity.

The writer, whose faith is founded upon results, having made use of electricity in every possible form for over twenty-five years, had occasion to call on one of my confrères, an eminent neurologist and professor in one of our leading medical schools, an author of a work on nervous disease; in his well-equipped office, I noted there was much to attract attention; and among the many devices were modern electrical apparatus which had been placed in his office since our call of a year or two previous; "What," I said, "are you using electricity?" The answer was, "I am playing with it." An argument followed. His claims were that none of us could say electricity did any real good, adding the psychic effect was all there was to it.

The facts are that man is like many others. He invests in electrical devices because there is a certain popular demand;

* Read before the American Electro-Therapeutic Association at Boston, Mass., September, 1907.

that a doctor of to-day should have such apparatus in sight. The facts are he had not given sufficient attention to electrotherapy to arrive at an intelligent understanding as to its real utility.

We use electricity because it is a therapeutic means of the greatest possible value, giving positive and unquestionable results which can be said of but very few drugs. We use electricity because it is nature's ~~safest~~ and most rational means of preventing and eliminating the cause of disease. The more intimately the physician becomes acquainted with the nature of electricity, its multiplicity, and the laws which govern it, the more easily will he comprehend its adaptability. We all know (who have tried to know) that some forms of electricity is a powerful stimulus to nerve and muscle, and that it rapidly imparts tonicity, buoyancy and firmness to relaxed and enfeebled muscular tissues.

While no well-balanced man will claim it is a cure all (a panacea) it is nevertheless a fact that its proportion of failure are no greater than that of drugs deemed reliable. Electricity is now recognized as a molecular wave closely allied to light and heat; in its application to the human body, the electrical energy is transformed into other forms of energy, chemical or physical.

It has often been demonstrated that certain forms of electrical energy increase metabolism by chemical or mechanical means or both; other forms correct disturbed equilibrium of functions and organs, through its influence on the nerve fibres, cells and nerve centers; it does increase the glandular organs to an increased functional activity and it is equally powerful in increasing cellular activity, accelerating in the elimination of diseased worn-out products in a normal way without drawing on or overtaxing the functional powers.

By some forms of electrical energy we are able in a truly normal way to improve digestion, nutrition, the secretory and eliminatory actions. We are confident we have in electricity a means that will unfailingly aid in the elimination of the residual poisons and waste matter from the system. In this particular, we have made an important stride in the prevention of disease, since as we all know, a large percentage of suffering is due to tardy eliminations, and the consequent auto-intoxicants.

We are assured there is an illimitable power in some of the

electrical energies antagonistic to self-poisoning through a biochemical action, and its powerful energizing effects. It is through faulty combustion, imperfect oxidation, we get the manifestations of rheumatism, diabetes, and neurasthenia. Electricity is the natural and rational stimulant to absorption, to increase the musco-nerve energy, to regulate the circulation, the breathing, the depuration of the liver, the urine and skin. In fact, the rational therapeutics of to-day is largely dependent on physical agents in contra-distinction to internal medicines. Electricity stands as pre-eminently first among the physical agents. Its modalities are innumerable; and are daily increasing.

Electricity is the natural regulator of tension, of resistance, and of the ebb and flow of molecular action, and molecular impulse. To the ever complaining neurasthenic electricity, light and heat come as tangible vitalizers. To the sedentary individual whose life vitiates, clogs and predisposes to inaction, electricity and its inseparable auxiliaries as light, heat, vibration and oxygen come as functional correctives, as positive preventives of organic degeneration.

Mechano-electro-therapy has a great future. The time is near when it will be recognized as the rational corrective of all functional disturbances, and will be resorted to by the multitude. Some form of electro-magnetic energy will fully take the place of the now indispensable vacation season of the brain worker and society devotees. We say indispensable vacation; we might better say the indisputable necessity for a change into a different electrical potentiality where the electrical conditions differ in such a way as to revitalize and build up the over-wrought, tired nervous system; requiring weeks, if not months as a rule and then too all depends upon getting under the requisite electrical tension; we all know how some persons recuperate quickly at sea levels, others get no benefit there, when higher altitudes quickly show good results, due unquestionably to the difference in the actual electrical conditions. We are certain the time is not far distant when the exhausted, over-worked, tired individual can have all his nerves which are crying out for, or his impoverished blood, and nerve centers require supplied within a few hours by means of certain electrical and other apparatus, provided by Institutions fitted for the purpose, or even in the home, or place of business.

Experimental research, long observation of nervous persons under our care in the institution, (the so-called nervous prostration cases) with their innumerable perplexing, unexplainable sensations—which were often non-responsive to internal medicine, on the contrary, internal medication generally aggravated the conditions, led us to try other means and to seek for the inducing cause, for something to supply deficient energy; a something to promote physiological processes, to energize cellular activity, and increase metabolism. As we become more and more familiar with applied electrical energy we succeed in combating the conditions presented; we were not long in being convinced that in molecular structures, every atom had an electro-chemical equivalent, that electricity was the normal regulator of the various forces of the body through its influence on the nerve fibres and cells.

We hold that the basis of ~~physiological~~ activity is electro-chemical and that a comprehensive understanding of physiological functions can only be reached by careful study of structures in conjunction with the electrical phenomena.



CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.

Attending Surgeon, American Oncologic Hospital, Philadelphia.

(Continued from page 140.)

Measurement of Current.—The development of heavy current work in the cataphoric treatment of cancer made the use of a meter of higher range than usual imperative. That such a meter should be reliable was also absolutely essential, particularly when investigation revealed a most disgraceful lack of reliability among the meters sold to physicians.

As a result, the author employed at first a specially ordered portable Weston meter, with two scales:—0 to 1000 milliamperes and 0 to 2000 milliamperes. This instrument, while reliable, has still been under the disadvantage of having to be specially ordered when wanted. Further experience showed, also, that the scale and index of this portable instrument were

too small to be easily seen by the operator standing or sitting several yards away, and that the lower scale was not low enough for minor cataphoric work.

The Weston Electrical Instrument Co. of Waverly Park, N. J., was therefore induced to construct and place on the



Fig. 10.—Massey Type Weston Milliampere Meter. The divisions of the scale may be seen some yards from instrument, and extend, on the two scales, from 0 to 100 and 0 to 2000 milliamperes, being capable of being read to $\frac{1}{2}$ milliampere.

market at a moderate price, an instrument designed by the author to meet these objections (shown in Fig. 10). This meter can be confidently recommended as specially adapted to both major and minor cataphoric applications. As its improved features are equally valuable in other applications of



Fig. 11.—Cataphoric Table, an aseptic, movable mounting of the Author's Controller and Meter, with multiple-attachment binding post for the active electrodes. Designed for both major or minor applications.

the constant current, this meter should be preferred to other styles in stationary apparatus of all kinds, such as the Cataphoric Table, Wall Plates and Cabinets, and may be specially arranged for portability, if desired, though somewhat large for this purpose.

The scales of this meter are about seven inches long, giving great range, and the index may be seen across the room. In spite of this large size of the index, however, currents on the lower scale, which reads from 0 to 100 in single milliamperes, may be read to one-half milliampere, and the increase to the maximum is most gradual. On the upper scale, which reads from 0 to 2000 milliamperes, each division of the scale has the value of 20 milliamperes, but considerable space is allotted to each hundred, permitting the turning on of a heavy current to be quite gradual.

The Cataphoric Table.—The desirability of having all the furniture in a modern operating room aseptic, simple, and free from wood or other absorbent material, induced the author to design the current applying table shown in Fig. 11, for use in the electrical operating room of the Oncologic Hospital.

The table is constructed of white enamelled iron and has a top of extra heavy glass with an ordinary glass shelf beneath. On the top plate a Universal Controller is mounted directly on the glass, with all connections beneath. In front of the controller there is ample space for the glass tray containing the mercury, acid, and water glasses, the active electrodes, etc. The meter is mounted on a brass arm fixed at an angle above the controller, and capable of being seen by the operator at any position. The two binding posts are on the front of the table, mounted on the glass plate, and a special feature is that the two poles are permanently designated by differently-appearing posts, the positive having five binding screws for attachment of as many wires leading to active electrodes, and the negative two binding screws for attachment of wires leading to the pad or the bipolar negative electrode at will.

Fig. 12 shows a rear view of the Cataphoric Table, with the fibre plate, on the inner side of which the series and shunt lamps are attached. The lamps project under the top plate of the table well out of the way, while the switches for throwing them "in" or "out" are accessible from the rear of the table.



Fig. 12.—Rear view of Cataphoric Table, showing switches for using series and shunt lamps in minor applications.

Just above this switch-board are the inlet binding posts of the table, to which the cords from a lamp socket or battery of cells are attached.

With both lamp switches turned to "in," and the plug beneath the meter in the "100" socket, the apparatus is ready for minor applications. With both switches turned to "out" and the plug in the "2000" socket, it is ready for a major application.

The table may be used with the direct current of the mains, the transformed direct current from alternating current mains, or with a battery of cells. It is furnished by Williams, Brown & Earle, Philadelphia.

The Indifferent Pole Dispersing Pad.—The indifferent or dispersing pole in a cataphoric operation or application is of

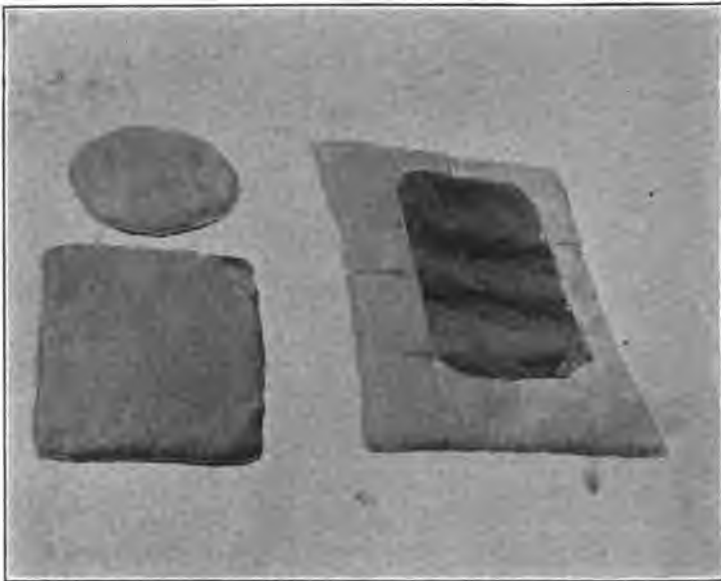


Fig. 13.—Kaolin Pads of various sizes, for use as Dispersing Electrode. The thin metal plate is shown on one.

course always connected with the negative pole of the apparatus, and when the application is a minor one it may consist of any good dispersing pad, such as those suitable in electro-gynecology. For the heavy current of a major monopolar operation a much larger dispersing pad is required to render

this pole free from more local action than a mere reddening of the skin. If this pad be too small, or so improperly arranged as to permit unequal dispersion of the current over the skin surface, alkaline eschars will form in the skin at this situation that are slow to heal and give the patient much discomfort.

After experiment with various materials the author has settled upon kaolin pads as in every way the best, this material being preferred as possessing the qualities of fine pulverization and neutral chemical reaction that best adapt it to physically absorb the alkaline chemicals that appear at this pole, as well as freedom from the possibility of staining white clothing. The intimate contact secured by all clay electrodes with the minute inequalities of the skin, thus broadening the area of practical contact between the skin and the electrode, is of course the chief value of this form of electrode. Kaolin is at present largely employed medically as the base of glycerine-bearing poultices.*

For convenience of handling, the kaolin is enclosed in flat bags made of crash toweling, and two such pads are usually required in the heaviest operations. Each pad, when filled properly with kaolin, should measure about 14 by 20 inches (35 by 50 centimeters), and possess a uniform thickness of one inch ($2\frac{1}{2}$ cm.). An additional pad of oval shape with extreme diameters of 8 by 12 inches (15 by 30 cm.), and of the same thickness, is a most useful size for minor applications as well as for gynecological applications.

In making these pads the material is cut somewhat larger than necessary and is securely stitched on the wrong side, leaving an opening in one end through which the kaolin powder may be subsequently poured, and is then turned and stitched around the edge, making what is called a "French" seam. The dry kaolin is then poured in and carefully distributed with a flat roller until the bag is evenly filled about an inch ($2\frac{1}{2}$ cm.) thick. The opening is then securely sewn up. Before wetting the pad the upper and lower surfaces should be tacked together at points about two inches apart by passing the needle through and through, for the purpose of keeping the pad of a uniform thickness throughout.

The completed pads are kept permanently immersed in water in a copper sterilizer of proper size possessing a perforated copper tray supported on short legs, permitting circulation

* Kaolin may be obtained in suitable quantities from Wm. M. Wilson's Sons, 225 Dock St., Philadelphia.

of water beneath the pads (Fig. 14). Before use the sterilizer is placed on a gas, electric, or other heater and warmed to a proper temperature. If the water within the sterilizer is occa-



Fig. 14.—Copper Sterilizer with perforated Inner Movable Bottom, designed for keeping the kaolin pads warm, moist and clean. Length 20 inches, width 14 inches, depth 7 inches.

sionally brought to the boiling point the pads are kept fresh and clean.

Pads thus made and kept continually wet are always soft and pliant, and the heaviest currents may be passed through them for long periods without harm to the skin. One of the large pads with its metal backing is sufficient for 500 to 600 milliamperes when applied to a broad skin surface, such as that of the back, but if a stronger current is to be applied for a long period both pads should be used, placed sidewise, and the wires connected with the metal plates should be carried together to the negative binding post of the apparatus.

Beneath the pad, furthest from the skin, a metal plate is placed. This plate is best made of thin alloy, such as is now largely employed as a protection in x-ray applications. The metal plate should be absolutely pliant and smooth, about two inches (5 cm.) less in both diameters than the pad, and should be connected with the negative binding post by a sufficient length of No. 26 copper wire, the wire being attached to the plate by threading it, duly bare'd, through some holes in the corner of the plate, and wrapping the plate before it several times. Care should be observed to cover this connection between the wire and plate with a small piece of rubber cloth before laying the pad upon it, as otherwise the current may short-circuit from the thinly covered wire through this portion of the pad directly to the patient.

The detailed method of placing this pad for an operation will be found in the next chapter.

(To be continued.)

Editorial.

THE TREATMENT OF JOINT DISEASES.

A GREAT error exists in practice at the present time in the general notion of employing fixation in the treatment of non-infectious inflammatory joints without fracture of bone or ligament; as well as the employment to too great extent of the same treatment in the management of infectious joints. Plaster of Paris, in the treatment of cases, except fractures, and Pott's disease, should be relegated to the past, and the more rational means be generally adopted.

Until it is realized that the limitation and cure of joint inflammation in most cases does not reside in the *vis medicatrix naturæ*, but that Nature's cure is ankylosis; and such common-sense precedures as the natural physical agents are brought into general use, there will be many ankylosed or painful joints which need not have been.

Convective and radiant heat relax and soften the tissues of inflamed joints, and, at the same time, induce a greater influx of fresh arterial blood into the tissues, improving nutrition, hastening elimination, and promoting a more active and beneficial phagocytosis which is so valuable when infection is present. These, however, are not sufficient except as elements tending to relieve local pain and suffering, and improving nutrition, except in acute traumatic conditions, in which induration and stasis are not marked.

In inflammatory processes the condition of stasis is ever present—areas of tissue stagnation impeding the reparatory processes and offering resistance to the improvement of the inflammation of joint and other structures, eventually resulting in the development of hyperplastic or redundant tissues, one or both, thereby steadily increasing the impairment of the utility of the joint. The removal of local stasis cannot be effected by heat, hyperemia, or any passive agent.

Mechanical vibration, in subacute joint affections, and as applied to the muscles, is useful in softening and relieving areas of superficial tension and contraction; and also, when applied in the form of vibro-massage, is superior to the usual method of manual massage in facilitating the removal of edema and swelling, and promoting the reestablishment of circulation

along the efferent and afferent channels, both circulatory and lymphatic, as well as hastening the restoration of general mobility.

The measure *par excellence*, however, for relieving the main obstacle to recovery of non-infected joint inflammations, villous, rheumatoid or traumatic, is the static current; to which no other measure known at present can be compared. The static spark, applied directly to the localized areas of infiltration, and stasis effects, by the energy of the tissue contraction induced, the elimination of the inflammatory products, making possible the restoration of circulation and nutrition into the deeper recesses of the joint, with greater certainty than any other means, and with results not suspected by the orthopedist who has not been familiar with the method.

The notion that the static modalities effect but a temporary influence and are in the main suggestive procedures, is waning. No safer or more energetic means of relieving inflammatory processes is known to science to-day than the static modalities scientifically applied; and those who will not awaken to the truth are certain to the same extent to neglect the sufferings of the unfortunates who come under their care.

* * *

D'ARSONVALIZATION IN THE TREATMENT OF HIGH ARTERIAL TENSION.

TO Professor d'Arsonval is due the credit more than to any other living authority of discovering the important effects of auto-condensation and auto-conduction, as applied with the high frequency currents for the relief of high arterial tension. The advancement of this branch of therapeutics has been hampered in the past by the want of proper appreciation of the scientific effects demonstrated by this early scientific observer. In the present light of pathology and the results of investigation arterio-sclerosis is well considered one of the greatest dangers to civilized life. Most authorities recognize auto-intoxication as the probable chief cause of high arterial tension, and that it is the precursor of arterio-sclerosis and its consequences—nephritis, apoplexy, cardiac hypertrophy, and final degeneration of the muscular system from impaired nutrition. We are therefore to seek intelligent means of combating, first, the cause of auto-intoxication, by the regulation of diet and

habit, and second, the institution of methods which will aid in controlling the rise above normal of arterial tension. For the latter drugs have generally proved inefficacious and now, the methods of d'Arsonval are rapidly becoming recognized as the best means in association with the regulation of habit and diet of regulating and controlling an already high or rising arterial tension.

The high frequency current is administered preferably by auto-condensation, by which method the patient, reclining upon a couch or table having a sheet of metal extending for five or six feet immediately beneath some covering of insulating material, as glass or felt, of sufficient thickness to prevent the escape of the electrical current from the metal to the patient during the administration, is connected to one pole of the d'Arsonval current of a high frequency apparatus either by a bifurcated cord, with a metal electrode in either hand, or by an electrode placed upon some other part of the body, the other pole of the apparatus being connected by a wire plate with the metal beneath the insulated material upon the couch. A prerequisite for the scientific administration of the high frequency current in this manner is a standardized hot wire milliamperemeter for measuring the current passing to the patient. From 400 to 600 milliamperes as registered from such a meter, of current derived either from a static machine having at least sixteen revolving plates or a Ruhmkorff coil, preferably from one of long-spark capacity, either apparatus being employed in connection with a suitable condenser, spark-gap and solenoid for d'Arsonval current, produces in most cases a pronounced lowering of arterial tension, as determined by the sphygmomanometer, causing a fall of the mercury column in different cases ranging from 10 to 25 millimeters, after a twelve to fifteen minutes administration of the current in this manner. The employment of auto-condensation by this method must be regulated to individual cases, and under the exercise of the good judgment of the operator, who should not undertake the employment of the method without considering the various conditions that may be associated with the high tension. In advanced cases, compensatory hypertrophy must be undisturbed, and while lowered for safety must not be reduced to normal. In advanced nephritis with high tension, auto-condensation must be employed with judicious care, and in connection with observations made with the sphygmomanometer, the doses and frequency of treatment should be regulated as indicated in all cases.

Progress in Physical Therapeutics.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

"Will Radium Cure Cancer?" Journal Am. Med. Assoc., December 21, 1907.

Haven reports a case of carcimona of the uterus with typical cauliflower excrescences, cured by persistent application of radium, extending over a period of eleven months. This was accomplished in spite of severe hemorrhages, debility and other distressing symptoms. The patient, a multipara, had a cystic growth removed from right breast January, 1899. There was no recurrence and no microscopic examination—February, 1900, she was operated upon for typical cancer of the cervix, followed by recurrence in May, 1905, with a cauliflower growth in the scar tissue of the cervix. The symptoms present were hemorrhage, backache, severe pain and enlarged inguinal glands. The radio-activity of the tube of radium and quantity were not given. It was introduced into the vagina, remaining *in situ* over night and withdrawn in the morning. This has resulted in an apparent cure which had persisted at the time of report for two years and nine months. There was no progress during the first six months. The condition culminated December 2, 1905, in a severe hemorrhage, leaving the patient almost pulseless and thoroughly exsanguinated. A curettement and application of equal parts of iodine and carbolic acid with iodoform tampon was used. From this turning point progress was noted. At the time of report, she used no morphine, had no pain, lymphatic glands were normal and had gained in weight and strength. No trace of original condition present. The vagina was contracted so that the little finger was introduced with difficulty.

"The Specific Action of Radium as a Unique Force in Therapeutics." Medical Record, October 12, 1907.

Dr. Abbe presents a series of seventy-seven epitheliomas treated with radium. If deeper tissues were invaded there was a progressive running ahead of the tissue treated, resulting in a superficial cure and partial deep reduction with subsequent lighting up of the former condition.

Epithelioma of eyelid seemed to be controlled and cured by radium as a specific. In melanotic warts the growth and pigmentation are arrested, but there is no reduction of tumor. Giant cell sarcomas react almost specifically to radium. He cites a case of small round cell sarcoma of the lower eyelid

of more than a year's growth which had resisted Roentgen ray treatment, but which was apparently cured in four applications of radium bromide, twenty milligrams total strength, and each application of one hour's duration. The sarcoma had involved the middle third of the lid and caused the disappearance of normal tissue.

In the case of a boy with sarcoma of the lower jaw, the bone was practically destroyed. Under the use of radium, the growth was rapidly reduced in bulk, developed ossific points throughout, and finally became solid with new bone. This boy has had no treatment for three and a half years and he now has a solid jawbone.

In the case of lupus of the face, the lesion completely disappeared from a single exposure to radium of 300,000 radio-activity.

Abbe advances the theory of the ions, as the secret of the vital spark, and suggests the possibility of the tumors being the result of the growth of erratic cells which have lost their electric equilibrium and which radium seems to possess the power of restoring. He regards the working unit of German radium bromide as ten milligrams 1,800,000.

Mild applications are curable by restoring the electric balance, but on the other hand prolonged and intense applications carry the balance to destructive termination.

In discussing the case of sarcoma of the lid in which normal tissue replaced the sarcomatous cells, Abbe assumes that the sarcoma cells had existed in the shape of an intercellular invisible ultra-microscopical system of particles with a life of their own constituting a network which had held together the visible cells. This system having taken on an erratic growth, became a sarcoma mass, and engulfed the occupants of the ground.

Remark:—This work of Abbe's is not only interesting and satisfactory but suggestive as well. Haven's case emphasizes the necessity of prolonged well localized applications or radium of an adequate radio-activity.

Cancer Caused by the X-rays. N. Y. M. Jour., February 13, 1908.

"Jayle practically reproduces the twelve observations reported by Porter and White in *The Annals of Surgery*, in which the cancer developed by exposure to the x-ray."

This simple abstract in the *Journal* as above quoted is liable to seriously prejudice non-posted readers against the x-ray. It is true that more of our failures and complications from x-rays, when used as a therapeutic agent should be published, and

that no extraordinary failures should be left unreported. This abstract would seem to indicate that some case, which was not a cancer, was simply exposed one time and changed to a cancerous condition. Now, the editor of this department believes this to be an absolute misrepresentation, or, in other words, it cannot mean what the author intended to express. The editor of this department does not believe that one treatment of any reasonable therapeutic dosage ever changed a benign condition into a malignant one.

I believe there is a remote possibility, in long continued therapeutic doses or in accidental exposures, as where a physician constantly uses x-rays (especially in the primitive manner of using the flouroscope and the hands for testing the rays, as many of us have noted in years past to our sorrow) of producing a cancerous condition, but he believes that nothing but absolute foolishness, combined with ignorance, will produce any such results. While the editor believes and knows that there is danger in the x-ray when improperly applied and ignorantly used, the day is past when any physician can conscientiously hide himself behind the plea of ignorance. At this day there is no more reason for a physician to be ignorant of the use of the x-ray than there is for the physician or surgeon to be ignorant of the technic of surgery. There are plenty of schools in cities at the present time for the teaching of the use of this agent, and no one should begin the use of the x-ray without qualifying himself for the work.

The editor in the last ten years has given a great many thousand x-ray treatments of every description and kind and he has never seen a benign condition changed into a malignant one. There is no necessity for any Roentgenophobia, when the agent is used with knowledge and reasonable precaution.

Report of One Hundred and Seven Cases of Cancer Treated with the Roentgen Ray. By Ennion G. Williams, M. D., Jour. A. M. A., February 22, 1908.

This is a very interesting paper read by Dr. Williams, and he makes a very good showing indeed. In the first part of his paper, his remarks upon the conditions of the cases, as to whether they are in active condition or stationary, is very timely. He omits the term of epithelioma entirely, preferring the use of the term carcinoma of which he considers all epithelioma a class. He considers cases originating from peritoses to be squamous-celled carcinoma. His first class includes those

lesions of the skin advanced beyond a keratosis, having a thick scale covering an ulcerated surface of long standing, with a history of growing more rapidly of late. In the same class also growths with elevated margins and ulcerated centers, growing steadily, having started usually from a mole or papilloma.

The second class are cases which began originally as those of the first class, but have reached an advanced stage and have invaded the deeper tissues, leaving a deep ulcerated sloughing area or a large cauliflower-like mass.

The third class includes extensive recurrent metastatic growth of the deeper structures.

The fourth class includes the carcinomas of the mucous membrane.

The fifth class includes the primary carcinomas of the breast.

The sixth class includes the recurrent carcinomas of the breast.

Class I. : Skin Lesions.—There were fifty-three of this class treated of which fifty-two were healed, one not healed due to an intercurrent attack of pneumonia, during which there was a renewed activity. This the ray failed to get under control. The ulcer was excised and healing took place. There has been no recurrence for three and one half years. In four cases there has been recurrence. All are healed at the present time. Of these the longest duration of treatment was twelve weeks and the shortest was six days. He thinks the ray should be continued long enough after the symptoms have healed to be sure to destroy the last malignant cell. Many of his cases heal without having produced any redness or tanning of the skin. He considers the typical manner for healing a big place is under a scab formation, which should become thicker and thicker and drier and drier; and the hope is, when the scab falls off, to find the process healed with little contraction or scarring. He thinks when suppuration takes place under the scab it is best to remove it and thoroughly cleanse the ulcer with a strong antiseptic, and then get another scab formation started. He likes Nature's dry crust or scab better than any surgical dressing, unless it is in very cold weather.

The Dosage.—To understand the dosage he points out that one must understand his own machine, tubes, and so forth; and he considers the dosage such, that in ten days treatment a slight erythema should be produced or hardly begun. The effect should be kept up until the growth heals. If time is an essential feature, the individual treatment can be increased until a slight dermatitis is purposely brought about. The disadvantage of this is the discomfort and uneasiness produced in the patient. Unless the influence of the ray is kept up until every cell is destroyed, activity is likely to be again set up, when it will be more difficult to get control with the x-ray than before.

Class II.: Advanced Superficial Carcinoma.—All patients had undergone other treatments that had proven failures or a recurrence had taken place. There were 17 cases in this class. The average number of exposures was 49 and the average time for duration of treatment was 5 months. The longest duration of time for treatment was 22 months with 79 exposures. The largest number of exposures in an individual case was 93, extending over 9 months, being a large protuberant growth on the back of the wrist, which was healed, but three years later there was a slight recurrence and this was again healed with the x-ray. Cases numbers 9 and 15 had an unfavorable idiosyncrasy and seemed to be aggravated by the rays; while number 12 showed a marked favorable idiosyncrasy. The results in the treatment of this class of cases are as follows:

Two were unimproved, four were improved, five were healed temporarily; that is, there was a disappearance of the malignant process followed by a recurrence, and six were permanently healed and no recurrence has occurred up to the present.

Lesions of the Deeper Structures.—He considers the results favorable in these cases except when one compares them with results in other methods of treatment; but in comparison with other methods of treatment, Dr. Williams' report of results is very favorable. Out of 9 cases of this class 5 were unimproved, 2 temporarily improved, and in 2 cases there was a disappearance of the growth. In 1 case there was a slight recurrence which was caused to disappear again by the use of the ray. The others have not recurred 20 months after treatment.

Carcinomas of the Mucous Membrane.—Of these there are 10 cases. Five were cases of the lower lip and in one of these treatment was discontinued after 11 exposures with no benefit. The other 4 were treated in varying periods from 2 to 6 months. They were greatly improved, but were finally excised and healed. No recurrence has taken place. The author now always advocates excision of the tumors of the lower lip. There were 3 cases of carcinomas of the tongue, floor of mouth, and glands of neck, and 1 case of the rectum, all of which were unimproved and patients died. A case of carcinoma of the tonsils was improved but patient finally died.

Primary Carcinoma of the Breast.—There were 3 cases of this variety, in which all were a success after long duration of treatment, but the author considers it best to operate early in these cases.

Recurrent Carcinoma of the Breast.—Of the 15 cases in this class the lives of all were prolonged and made comfortable. Only 3 of the 15 were unimproved. Seven cases showed a marked improvement and in 5 cases there was a complete disappearance of all evidence of disease. He thinks these cases should be treated some time after a complete disappearance of symptoms.

Apparatus and the Method of Treatment.—Dr. Williams has 2 static machines and 3 coils and various interrupters. He prefers for treatment the coil and mercury interrupter and likes an old seasoned tube. A milliamperemeter and a Benoist penetrometer are constantly used. He usually has passing through the tube three fourths to one milliampere. The anode is placed at from 6 to 10 inches in superficial cases, and from 10 to 16 inches in the deeper cases. Time of exposure varies from 10 to 20 minutes. He uses no screens or filters except to protect the unexposed parts. He uses Jacobi's methylene blue, strychnine and arsenic mixture, and claims he gets benefit from its use.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Treatment of Arteriosclerosis. By L. Steinsberg.

L. Steinsberg, in the *Berliner Klinische Wochenschrift*, pleads for earlier treatment of arteriosclerosis, at the first sign of its appearance, even in the young. It is the malady of civilization, and if physicians accustom themselves to look for it they will be amazed at the number of young persons with the Cain's sign of thickened, tortuous temporal arteries. During the initial phases of the affection the arteriosclerosis may be regarded as latent, and proper prophylaxis in this stage will postpone its further development for years. Excessive physical exercise and the reverse, excessive sedentary occupations, overabundant diet, excessive ingestion of fluids, abuse of tobacco and alcohol, all these factors must be regulated, and moderation should be preached in all things. Excess of meat by ptomain production, and excess of vegetables by the large amounts of lime, are both harmful. Reduction of the intake of salts is to be recommended, and ergot and potassium iodid have also favorable effect. The latter renders the blood more fluid. Carbonated baths and "cold rubs" are particularly useful and never do harm. Their influence on the dilatation of the cutaneous blood vessels and on the vagus are factors of the greatest importance in treatment of arteriosclerosis. They are of still more importance in prophylaxis. Brine baths have also a pressure-reducing action, and, in combination with carbonated baths, have often done good service.

Drowning and Resuscitation.

E. Margulies in the *Berliner Klinische Wochenschrift*, XLII, Nos. 24-25, shows that the first phase of drowning—that of arrested respiration—lasts from thirty-one to seventy-six seconds, according to different authors. The second stage, that of dyspnea, lasts from sixty- to 150 seconds, Brouardel

favoring the shorter time. The drowning man breathes deep, with open eyes, and swallows water. The third stage—that of asphyxia—lasts for one minute, according to Brouardel, and the terminal respiratory movements for about thirty seconds longer. Rescue during the first minute of drowning has every chance of success; the chances during the second minute are less favorable, and after the beginning of the third minute they grow more and more dubious. Brouardel has further established the fact that when an animal is drowned after excessive muscular fatigue these various stages of the drowning succeed each other in less than half the time required in normal conditions. One factor that prolongs the act of drowning is that the drowning person is liable to come to the surface and get a breath of air, thus postponing the terminal stage. In sea bathing, to prevent accidents from drowning, Margulies advises that attendants be stationed where they can reach a drowning person in less than one minute. No time should be wasted in throwing life preservers, but the attendant must be ready with a boat. As the interval is so much shortened in case of fatigued muscles, a narrow limit should be set for the swimmers; anyone passing beyond that limit doing so at his own risk, on account of the inability to reach him in the half of the brief interval on which one can count in the case of other drowning persons.

Balneotherapy in Affections of the Air Passages.

G. Spiess in the *Berliner Klinische Wochenschrift* XLII, No. 22, May 29, 1905, adds another to the long list of the articles on the subject of balneotherapy in its various applications with which our German exchanges have been teeming since the Congress of Balneology at Berlin in March. He remarks that catarrh of the upper air passages is almost inevitable in persons who snore. Such persons are usually corpulent, short necked and constipated. Exercise, fresh air, a light diet and a course of mineral waters will accomplish wonders, reducing the tendency to snore and healing the catarrh. Incorrect use of the voice is another factor in maintaining a catarrhal condition of these parts. The time at the health resort might be utilized for training the voice in better habits.

The Therapeutic Use of Water Drinking and Some of Its Dangers.

E. H. Root (*Woman's Medical Journal*) believes that the normal amount of water required can be regulated by thirst. Reduction of body water by 1 per cent. produces thirst. If water can be substituted by tea, coffee, etc., without increasing the amount of liquid the advice to drink it is good. The total water in a body weighing 165 pounds is 115 pounds, and 6 1-2 of these are excreted daily. The weight, the amount

of liquids already taken, the amount and character of the food taken, the activity of the skin, kidneys, and intestinal tract, the condition of the heart and arteries, and the occupation should all be considered before prescribing water drinking, and its effects should be as carefully watched as any other therapeutic measure. It is absurd to fill a man of sluggish activities, who is a large eater, with more water than he needs. When water is abnormally increased the heart is brought into greater action and the blood-pressure in the arteries is disturbed. If the skin is active, as in warm weather, the water may escape through it at the expense of the kidneys. The urine being thus concentrated irritates the kidney structures, and this is followed by lessened excretion of waste products that the skin cannot carry off. Retention brings on a train of symptoms referable to the heart, arteries, and nervous system, the results of which may be serious if there is previous impairment. While the blood is not an absorbing tissue and the muscles and subcutaneous tissues imbibe two-thirds and the skin a sixth of the water injected, the heart must exert greater effort to force the blood through the arterioles and capillaries of water-logged tissues. This will sooner or later cause first hypertrophy and then dilation.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Tuberculin in Tuberculous Kidney.

Pielicke in *Berliner Klinische Wochenschrift* (January 20, 1908) reports a case of unilateral renal tuberculosis treated by tuberculin injections. Symptoms had lasted for eight weeks at the beginning of treatment. There were renal colic and symptoms of suppurative cystitis. Tubercle bacilli were abundant in the urine.

Treatment was continued for four months. Injections were given on an average of three times in two weeks. Febrile reactions were avoided.

Under treatment the symptoms subsided rapidly. Two years later the patient was free from symptoms. The urine contained only a very small number of bacilli found only after a prolonged search.

Graduated Labor in Pulmonary Tuberculosis: the Effect of Exercise on the Opsonic Index of Patients Suffering from Pulmonary Tuberculosis.

These are the titles of two articles in the *Lancet* for January 25, 1908, by M. S. Patterson and A. C. Inman respectively.

Patterson shows in his paper that a great many cases can be very markedly benefited by graduated labor. This includes

exercises graduated up to the hardest kind of navy work. The amount of exercise required varies markedly with different individuals, and some who do not improve with light exercises immediately gain on more vigorous. The points to be emphasized are that the exercises are to be graduated and that they are not to be pushed to the point of causing a febrile reaction.

Inman's work, which is laboratory in character, is complementary to Patterson's. He shows that the effect of the exercise is to raise the opsonic index. The principle is the same as in tuberculin injections; the patient, however, inoculating himself.

A New Method of Treating Leprosy by Training the Phagocytes to Cure the Disease Through Subcutaneous Inoculations of Pure Yeast Cultures and Dead Bacilli.

Ashmead in the American Journal of Dermatology reports remarkable improvement in a case of leprosy of nine years' duration treated in this manner.

Pure yeast culture cells are administered hypodermically, at intervals varying according to the falling off in the phagocytic power.

These pure culture cells were obtained according to the process of Professor E. Chr. Hansen, of Copenhagen.

Two c. c. of these cultures were inoculated first one on each side in the gluteal region of the leper beneath maculo-areas and a leproma. Yeast abscesses resulted, with but little reactive inflammation. These injections were made deep; much infarction resulted, with but little reactive inflammation. Forty-eight hours afterwards they were lanced and their contents drained. Healing readily occurred. The infarctions continued several days. When these infarctions had disappeared, new abscesses were created by injections of 2 c. c. of the pure yeast culture cells mixed with the drainings of the preceding abscesses, first drying the liquid, then sterilizing and washing it, then emulsifying it with camphorated oil. Two c. c. of this emulsion was injected with 2 c. c. of the yeast cells. The contents of these abscesses at last showed by methylene blue coloration that all the yeast cells were dead; then the abscesses healed. Living yeast cells will not stain blue.

The enzymes, glucose and zymose, or ferments were still active, however, as was shown by inoculation of the material by itself in the arm which produced an abscess, or by testing it on sugar solution in the laboratory. When seven of these series of inoculations (two at a time always) had been made a vaccination scab, formed by eversion of the opening of an abscess, made directly beneath a prominent leproma. This was emulsified and mixed separately without any abscess contents, with the pure yeast cultures and inoculated beneath a leproma.

The result was that an abscess more inflammatory than any others formed. The contents of this were then mixed with the fresh yeast cells and so on and the inoculations proceeded, always waiting, however, until each time, the inflammatory areas or infarctions had subsided, or almost done so. New areas of inflammation were thus continuously created. The surrounding areolæ widened, each succeeding inoculation, and yeast serum increased as contents. These contents showed progressive areas in number of leucocytes. The best immediate general result of the inoculation occurred when an abscess showed a large erysipelous inflammation spreading over a great area.

Under this continuous treatment, the pendulousness of the ears has disappeared, the maculations on the side and back are all gone, the nodulations have shriveled and smoothed out, the eyebrows do not now show the leontastic effect; the lepromæ between them being smoothed. All the discoloration of face is gone, and the groups of nodulation along the course of ulna, radial, and peroneal nerves cannot be detected. The engorgements of his hands and feet, which were excessive, have resolved themselves, while his two open lesions, a large plantar ulcer of several years' standing is almost healed, level with the skin, and a tropho-neurotic ulcer of large size on the outer side of his foot is built up and nearly skinned over. In two weeks more both these lesions should be perfectly healed. The sudden turn here for the better in all these symptoms is remarkable, and is due entirely to the addition of the yeast culture cells and dead bacilli inoculation to the ordinary treatment which he was pursuing before.

Chaulmoogra oil had been taken by this patient for five years to my knowledge; 180 drops daily dosage increased at one time to 300; then decreased to 120, and then increased again. In spite of all this alone given, the case went behind; both ulcers appeared and the lepromas multiplied. The case only began to recover when the new method was instituted, and has steadily marched along towards recovery ever since being put upon it.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

CHAPTER III.

RADIANT LIGHT AND HEAT.

(Continued from p. 163.)

The physical characteristics and the differences in those characteristics as exerted by the various frequencies, may be considered with reference to frequency or rate of vibration and wave length as affecting (1) penetration, (2) refraction, (3) polarization, (4) fluorescence, (5) color, and (6) heat production; and as affecting human tissue, (1) inducing hyperemia, (2) producing tanning, (3) superficial and deeper effects upon metabolism, (4) actinic actions—affecting oxidation and germ life, and (5) reflex effects upon functions remote from the surface through the end neurons and nerve connections.

The frequency and wave length of the radiations of light vary from 450,000,000,000 per second of red to 850,000,000,000 of violet, between which range the rates of the other frequencies. The wave length shortens relatively as the frequency increases; and it has been also practically demonstrated that the penetration diminishes with the wave length. In other words, the infra-red or heat radiations, of the lower frequencies of light, have relatively greater power of penetration than the ultra-violet and higher light frequencies, blue, indigo and violet. This rule of decrease in penetration applies with increase of the angle of refraction as the frequency increases until, as Lodge has said, "the wave lengths are found that are smaller than the atoms, when they go straight on," as do the x-rays.

Refraction.—When a ray or beam of light passes between media of varying densities, they are bent out of their direction, both at the entrance to the denser and the exit into the rarer media, being bent at an angle towards the perpendicular let

fall to the plane of the surface in the first instance, and from it in the second, Fig. 1. It is by refraction through a prism that white light is resolved into the prismatic colors. A beam of white light allowed to fall upon a transparent prism is divided

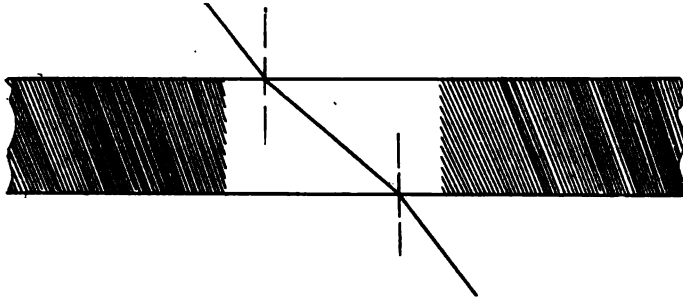


Fig. 1.—Illustrating Refraction.

into its component parts. Beginning with the more refrangible, the order in which the colors occur are as shown in Fig. 2. Passing from the violet to red, with the varying degrees of refraction, and the varying colors as may be shown by throwing

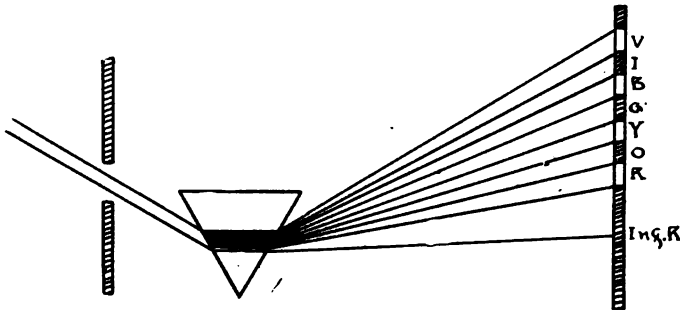


Fig. 2.—Showing refraction of a beam of light passed through a prism, and the order of the spectral colors.

the refracted rays upon a screen in a darkened room or as seen in the rainbow.

Reflection.—The property of light, whereby a pencil or beam of light thrown against certain surfaces is caused to be reflected backward or at an angle according to the obliquity at which the rays strike the reflecting surface, the angle of incidence being equal to the angle of reflection; i. e., if a perpendicular be drawn or let fall to a reflecting surface, the angle

formed between the line of light and the perpendicular will be equal to the angle between the opposite side of the perpendicular, and the line of the reflected radiation, Fig. 3.

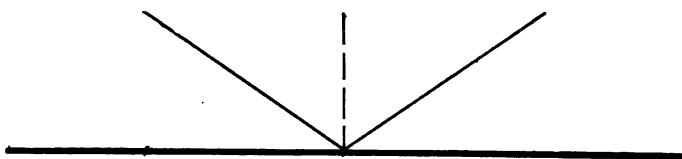


Fig. 3.—Showing angle of incidence and angle of reflection.

These laws of reflection obtain also with the reflections from concave mirrors, the proximity of the luminous body to the reflecting surface varying the focal points of the radiation,

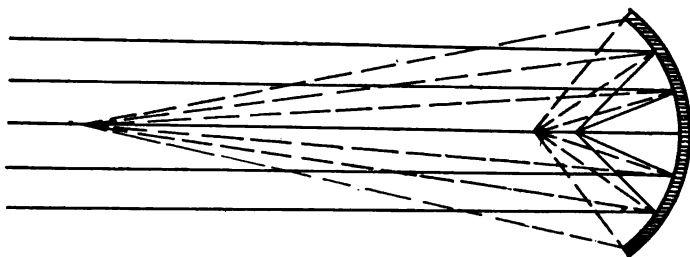


Fig. 4.—Showing reflections in parallel and convergent from concave mirror.

Fig. 4; or when placed at the requisite angle, produce parallel radiations as illustrated in the accompanying drawing. Another matter of particular consideration to the therapist is

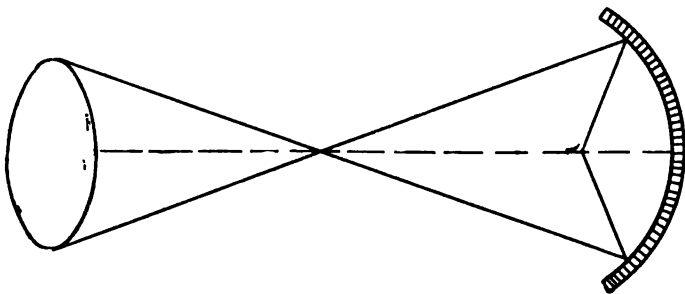


Fig. 5.—Indicating crossing of convergent rays and dark spot beyond, within which shimmer appears.

the fact that beyond the focal point where the rays cross, a ring of light is produced surrounding a dark center, Fig. 5. Within this light ring a violet shimmer appears which will mis-

lead the unsophisticated, and may be made use of to lead physicians into the wrong impression, that this shimmer is the violet or ultra-violet radiation, which is quite false. It should always be considered in investigating an apparatus where the focal point will fall, and with the understanding that, except immediately beyond the focal point, where the invisible ultra-violet is present, the rays are dispersed in such a manner as to be of little use for therapeutic purposes. From the incandescent light, with parabolic reflector, the point of greatest intensity of heat would be at about the focal point, the degree of intensity diminishing as the object is placed nearer to the reflecting surface.

Polarization, as of interest in the consideration of light, consists of a double refraction that occurs when light passes through certain substances as Iceland spar, and is not of significance as pertaining to therapeutics.

Fluorescence, as induced in certain substances, is a secondary effect arising from the projection of radiant energy. Some substances, as sulphide of calcium, continue to fluoresce for hours after prolonged exposures to radiant light. Certain substances also fluoresce under the radiations of the higher invisible frequencies of radiant energy only, as the fluorescence of willemite, tungstate of calcium, and platino-barium cyanide under exposures of ultra-violet and x-ray radiations. It is by this property of light and matter that we are able to discern the presence of the invisible frequencies.

Color is the manifestation of the various degrees of refrangibility of the spectral rays of light,—the radiations that constitute light. Some writers of recent date have erred in the use of the term light, applying “x-light” to the x-ray, and “ultra-violet light” to the frequencies above the violet; whereas, only the visible frequencies constitute light. The ultra-violet, x-ray, and infra-red are the invisible frequencies of the spectrum, and are discerned only through the means of fluorescence, and the effects upon sensitized plates, with the higher frequencies, and by the thermopile as registering the radiations of heat with the lower frequencies. It will be seen that radiant light and radiant heat are very closely allied; the lower frequencies of light, the red and orange, containing heat radiations, as evidenced by the thermopile. The infra-red or heat rays have their maximum heat intensity at a short distance from

the red; but are present to a less degree at a distance from the red about equal to the range of the visible spectrum from red to violet. The higher frequencies of the ultra-violet and the x-ray are devoid of heat radiations. This fact readily explains the difference of the temperature of incandescent bulbs transmitting the red, orange and white light, as compared with the blue or violet bulbs in which the lower frequencies are absorbed; the heat of the latter becoming markedly more intense under radiations employing the same candle power than the transparent red or orange incandescent bulbs. In other words, a secondary radiation is induced from the glass of the violet bulb plus the infra-red, radiations from the conversion of the lower frequencies into heat by absorption, which renders the heat radiated of greater intensity from the bulbs of blue or violet.

The physical properties of light above described are of interest only in therapeutics, as defining the properties of the agents employed, the principles of which are significant and suggestive as to the effects produced upon the human organism.

The effects of radiant light and heat upon human tissue are complex from the nature of things, and not always easy of determination; as the processes of metabolism are so difficult of demonstration—the building processes of anabolism, and the taking down and removal of effete materials of katabolism. These metabolic processes, dealing with the appropriation of the nutrient circulating fluids, and combining both physical and chemical qualities, indicate the necessity of incessant activity, with the supply of the necessary pabulum for repair relative to the activities of the organism as a whole, or the part of the organism in question.

If light and heat energy are necessary to the carrying out of the body's normal processes, most living creatures requiring light and heat for the maintenance of health, the effects are prerequisites.

The chemical processes of the human body in a state of health, without exercise, are capable of supplying the requisite amount of heat to resist only moderate degrees of cold, requiring an increased chemical action and tissue combustion for the maintenance of the normal body temperature unless a surrounding temperature approaching 60° to 80° F. is maintained, otherwise the escape of body heat must be prevented by cloth-

ing of non-conducting material to prevent cooling by convection.

The chemical actions of light, as inducing oxidation and actinic effects, are irritating and destructive, unfavorably affecting certain forms of germ life, and for this reason notably of value in therapeutics.

Tanning of the skin, by the effects of radiant energy, is induced by the higher frequencies, particularly by the invisible ultra-violet radiations. This is demonstrated in the experience of those who have used the high candle power incandescent lamps and light baths, when numerous prolonged exposures, made from these sources, invariably have not produced tanning; whereas, by the employment of the arc light, or the arc light bath, either the localized treatment by high candle power arc lamps, rich in the higher frequencies, tanning invariably results. The writer has verified this from his own experience, and from this fact has abandoned the use of the arc light and ultra-violet frequencies, except with the employment of intervening glass screens, in the treatment of conditions in which stimulating and metabolic influences of the penetrating rays are indicated.

(To be continued.)



BOOK REVIEWS.

HYPNOTIC THERAPEUTICS IN THEORY AND PRACTICE, with numerous illustrations of the Treatment by Suggestion, by JOHN DUNCAN QUACKENBOS, A.M., M.D., author of "Hypnotism in Mental and Moral Culture," "Practical Physics," etc. New York and London: Harper Brothers, Publishers. 1908. Price \$2.00 net.

The writer since the appearance of the initial volume has devoted himself with very little interruption to the practical application of suggestional methods of treatment applied to physical and mental conditions. The present book is a record of many thousand recent experiences covering seven years of investigation.

From the therapeutic point of view the writer observes that "the conditions and diseases that are successfully dealt with through the medium of suggestion, comprise functional errors of digestion, metabolism and circulation (including obstinate constipation, seasickness, migraine, intermittent heart)—chorea, occupation neuroses, habit spasms, speech defects, and neurasthenia or nervous exhaustion, with its delusions, morbid fears, and imperative conceptions—drink and tobacco habit, with drug addictions—mental troubles, insomnia, homesickness, obsessions, irresistible impulses like those of moral perversion—intellectual unbalance, dementia præcox, and incipient insanity." Suggestion is further used to "relieve the severe pain of neuritis (sciatica), or organic diseases of the spinal cord (locomotor ataxia), of angina, rheumatism, and cancer."

He states that the maladies included have been substantially relieved and many of them radically cured by accredited hypnophysicists. The writer has farther exploited sleep inspiration in the cure of moral diseases that defy all other means of treatment (kleptomania, habitual falsehood, mania for gambling, moral anesthesia, and perversion); in the correction of disequilibrium; in the management of backward and unmanageable children; and in the elicitation of literary, musical, and histrionic talent.

Chapters of the work are devoted to The Transliminal, Sleep as a Suggestible State, Suggestibility in the Dying, Rapport and the Mutual Relationship, Degrees of Suggestibility, Auto-suggestion, Practical Applications of Physico-Therapeutics—Physical Disease, Neurasthenia or Nervous Exhaustion, and numerous other subjects.

The volume is the work of an advanced thinker and investigator who has devoted himself to the study of all of the features and phases of the science, and while in some reports the views of the writer seem extreme, his position is a most difficult one, and seems to establish beyond question the importance of the recognition by the medical profession of the psychic side of therapeutics. The volume is issued in the characteristic excellent style of the publisher.

THE PRODUCTION AND HANDLING OF CLEAN MILK. By KENELM WINSLOW, M.D., M.D.V., B.A.S. (Harv.), formerly Instructor in Bussey Agricultural Institute and Assistant Professor in the Veterinary School of Harvard University; Author of a text-book on Veterinary Materia Medica and Therapeutics; Chairman of the Committee on Milk of the Washington State Medical Association, etc. New York: William R. Jenkins Co., Publishers, 851-853 Sixth Avenue. Price, \$2.50 net.

The writer of this book is a graduate in agricultural science, in veterinary and human medicine, and having been connected with a laboratory in which the milk of a large city is examined, has prepared the work with the qualifications that should guarantee that it is the result of practical and scientific experience. In his preface he states that the unfortunate farmer is apt to receive an unjust share of censure because of the uncommonly unclean condition of market milk which has been, before reaching the consumer, through the hands of sundry other persons. On the other hand, he states that the city dealers may have much influence in instructing the farmer to live up to the recognized standard of cleanliness; but after all, the chief responsibility lies with the consumers. He also calls attention to the fact that the milk crusades should awaken the outlook not only to the dangers, but to emphasize the fact that it is impossible to produce clean milk except at an increased expense. He calls attention to the fact that the farmer often receives but one-fourth of the retail price of milk, under which conditions he can hardly be expected to undertake the increased expenditure for producing clean milk. The work considers the subject from all practical points, devoting chapters to Germs, Composition of Milk, Milk Products, Stock-Feeding, Housing and Care of Cows, Handling of Milk and Cream, Cost of Producing and Distributing Clean Milk, Hints Concerning Milk Distribution, and Milk Inspection. He also gives plans of barns and milk houses, and a general outline for the control, supervision, and inspection of a city milk supply.

This work will fill an important place in the literature of the subject, and should be in the hands not only of the farmer who produces, but of the dealer, the medical inspector, and the consumer as well. It is to be highly commended from every point of view. It is well illustrated, having 47 cuts and 15 full page plates. The publishers' work has been done in a most creditable manner.

COSMETIC SURGERY—THE CORRECTION OF FEATURAL IMPERFECTIONS. By CHARLES C. MILLER, M. D. Published by the author, 70 State St., Chicago. Price, \$1.50.

The writer has endeavored to set forth in this little volume from practical experience methods for treating various deformities and defects that may be overcome for the purpose of beautifying the features of the individual. In the course of the

work he devotes himself to the rationale of his methods and seems to have set forth in a practical way the following methods: The Prevention of Outstanding Ears; Reconstruction of the Ear; Adherent and Undeveloped Lobule; Folds, Bags and Wrinkles of the Skin About the Eyes; Reduction of Hump Nose; The Tip Tilted Nose; Nose with the Bulbous Tip. He maintains in considering Paraffin injections for general use, that they are objectionable on account of unpleasant after effects, but justified in a great many cases. He considers the method of Correcting Inverted Lip; Correction of the Angle of the Mouth; The Tattooing with the Electric Needle for improving the appearance of the brow; Outstanding Alæ Nasi; Double Chin. There is no doubt but that the writer is an artist in this particular department. The majority of his results are wrought by surgical procedures.

THE PRACTICAL MEDICINE SERIES, comprising ten volumes on the year's progress in Medicine and Surgery. Under the general editorial charge of GUSTAVUS P. HEAD, M. D., Professor of Laryngology and Rhinology, Chicago Post-Graduate Medical School. Volume I. General Medicine, edited by FRANK BILLINGS, M. S., M. D., Head of the Medical Department and Dean of the Faculty of Rush Medical College, Chicago; and J. H. SALISBURY, A. M., M. D., Professor of Medicine, Chicago Clinical School. Series 1908. Chicago: The Year Book Publishers, 40 Dearborn Street.

This volume purports to give the progress in medicine and surgery, and in its general arrangement includes the usual classification of disease, including the Respiratory Organs, the Circulatory Organs, the Blood-Making Organs, Infectious Diseases, Diseases of the Ductless Glands, including Goitre and Addison's, Metabolic Diseases, Diseases of the Kidneys. In each instance the régime includes the pathology, physiology, symptomatology and therapeutics. The subjects are treated in a clear, concise and practical way, based upon general deductions drawn from the current medical literature of the year. A feature of the work is the attention given to the methods of diagnosis, notably in diseases of the circulatory system. The authors have given particular attention to the examination of blood pressure by the sphygmomanometer. They also call attention to the value of mechanical vibration as applied to weak and dilated heart in which it was demonstrated by orthodiagraphy, that such hearts were remarkably diminished in size, following ten minutes vibration. The Nauheim treatment is also discussed as meeting the same exigencies. The employment of diet, as regulating arterial tension, has also received practical consideration. The work is full of valuable suggestions, contained in a small book of more than 400 pages, and is cordially commended as a fairly complete and scientific exposition of the progress of medical science.

The Journal of Advanced Therapeutics

VOL. XXVI.

MAY, 1908.

No. 5.

THE WAVE CURRENT AND HIGH FREQUENCY CURRENTS.

BY WILLIAM J. MORTON, M. D.,

Professor of Diseases of the Mind and Nervous System, and Electro-therapeutics, New York Post-Graduate Medical School and Hospital.

The wave current constitutes a phase of the development of electro-therapeutic practice in this country. To describe it, as you kindly suggest, to our European confrères necessitates a brief retrospect of its relation to other high frequency currents.

In 1880 I had the privilege of being a student with Professor Charcot. "Static electricity" at that moment was one of the novel features of his teaching. Deeply interested I returned to America, taking with me two of the best influence machines and their electrodes. In March, 1881, I read a comprehensive paper ¹ before the New York Academy of Medicine, exhibiting the machines and the methods of administration I had learned in France. I communicated, furthermore, an invention of my own of a "new induction current in medical electricity," and this new current phenomenon I named "the static induced current," remarking in conclusion, "this then is an entirely new current in medicine; it has a record yet to make."

At this time influence machines had never been used in medical practice here and were scarcely known in laboratories. These two imported machines and their electrodes, together with modifications for the production of the static induced current, served as models for manufacturers, and based upon the Academy paper the practice of electrostatic therapeutics quickly acquired a medical vogue. The point I would emphasize is that these two original imported machines were of the Holtz type. This type has persisted to the present day and to this fact is due the wide acceptance of the wave current in

practice, for the effect upon the patient is not painful, as when a Wimshurst Sector machine is employed, and the arrangement is extremely simple since no condenser (aside from that constituted by the insulating platform and the floor) and no complicated connections are required.

But to turn more directly to the evolution of high frequency currents. Wilkinson, Cavallo, Mauduyt, and other classical writers, early described the Lane Electrometer, by aid of which the individual shocks of a Leyden jar could be measured in intensity and be safely applied to a patient. But nowhere in their writings is the fact of physiological tetanus mentioned, showing that the result obtained was, as claimed by these writers, a single Leyden jar shock of predetermined intensity. Lord Kelvin showed that electricity must oscillate when sparking. Feddersen demonstrated that the single discharge of a Leyden jar was, or might be, oscillatory. But as is now known, the jar is a comparatively poor oscillatory. As used by Feddersen it gave only 20,000 to 400,000 oscillations.³

The measured shock arrangement of Cavallo differs radically from the modern high frequency circuit. The following diagram represents the Cavallo method.³

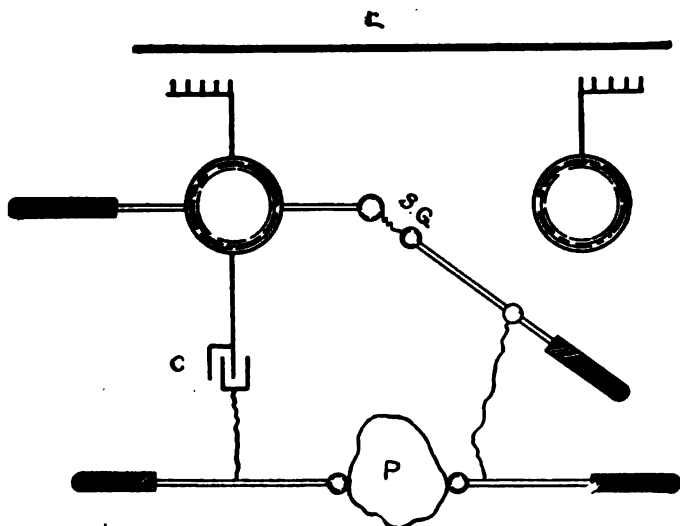


Fig. 1.—Cavallo apparatus, 1780; Lane Electrometer and Leyden Jar shocks. E, Electrical Generator; S.G. Spark Gap; C, Condenser; P, patient, who receives the direct shock of the discharge and all the current which causes the spark.

The defect of this arrangement is, that the circuit of discharge of the Leyden jar condenser is completed through the patient and the spark gap, which are in simple series. By the modern methods the direct discharge traverses the spark gap but does not traverse the patient. As a matter of fact the therapeutic effect of the direct Leyden jar discharge is most harmful.

Sir Oliver Lodge, in his masterful manner, has taught us the difference between the "A" spark (corresponding to the spark obtained by the discharge of a single Leyden jar) and the "B" spark obtained by the discharge of the external armatures of two jars. See Fig. 4. He says,⁴ "The 'A' spark is always much more dangerous than the 'B.' Why? Both are oscillatory, but in the 'A' spark you have a rush of electricity in one direction, and that is what produces the deleterious effect. I don't know whether it electrolyses the tissues or what but it is certainly dangerous. But when you send the electricity by the 'B' circuit you start and stop at zero. Everything is quiet until the rush occurs. It is perfectly neutral until the rush occurs, which is precipitated by the 'A' and then the oscillations go backwards and forwards, and then all become neutral again. There is no rush in one direction, the plus and minus being precisely equal; whereas the 'A' oscillatory discharge has the plus in excess in one direction, and if it is strong enough will kill you. The other, however strong, is hardly felt. It is a very remarkable thing that these oscillations—in this case about a million per second, rather more (about twenty millions) in the case of those fast discharges—should have no perceptible effect. . . . And yet there is a very fair amount of current passing."

As a matter of personal experience anyone who has received the shock from a Leyden jar knows the peculiarly distressing general sensation which makes him dread a second one.

It is evident, therefore, that the successful production of a high frequency current as known to-day must require a different arrangement of condensers.

Such an arrangement was first made known in my paper alluded to, published in 1881, and the current phenomenon produced constitute the first application of high frequency currents to medical practice.

This arrangement is illustrated in the following diagram.

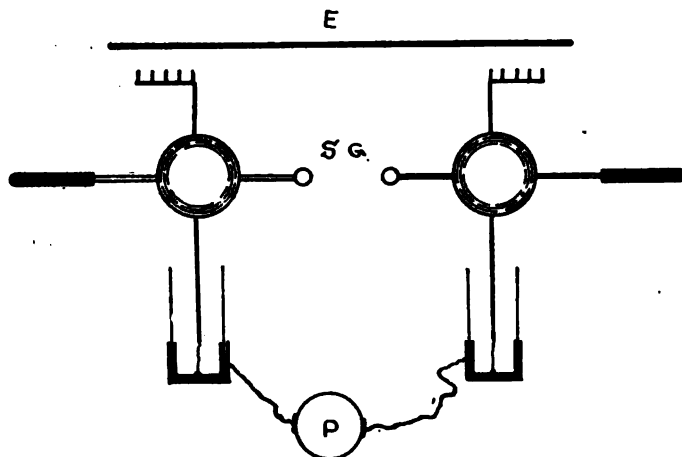


Fig. 2.—*Static Induced Current of 1881*; rheophores and patient, P. E. Electrical Generator. A rapid flow of sparks passes between the discharging rods; the wires connected to the external armatures are the seat of current phenomena. The best results are obtained from small Leyden Jars.

That the above arrangement does under proper conditions actually produce a high frequency current goes without saying,

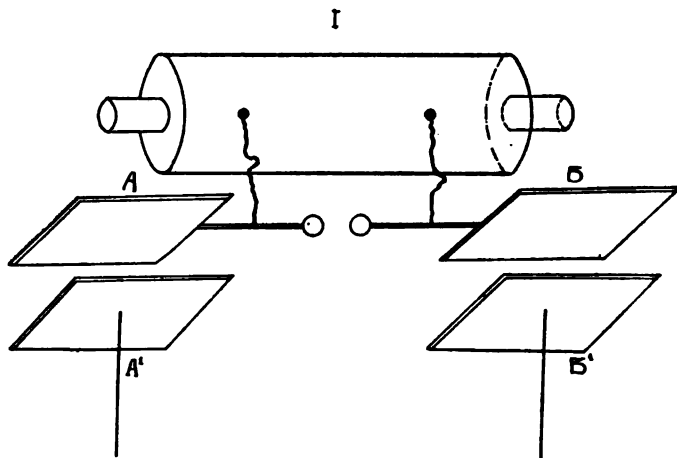


Fig. 3.—*Hertzian oscillator of 1887*; Induction coil or Holtz machine. The condenser plates A and B are charged positively and negatively. The Plates A' and B' are inductively charged with electricity of opposite signs and the wires become the seat of an oscillatory current of a frequency determined by the oscillator.

for we may duplicate it exactly (using static machine or coil at will) by a diagram of the Hertzian oscillator devised by Hertz in 1887 and arranged to propagate a high frequency current along a wire,² as shown in Fig. 3.

It is, of course, also apparent that Fig. 2 (the static induced current arrangement) represents the "A" and the "B" circuit of Sir Oliver Lodge described by him in 1884.⁴ (Fig. 4).

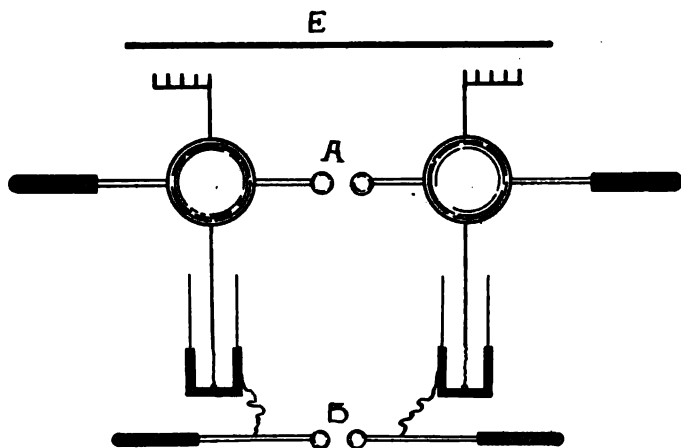


Fig. 4.—Lodge's *A* and *B* Circuits, described by him in 1888.

From this period onward following the epoch-making and continued physical investigations of Hertz, Lodge, and others, the vibrations or oscillations in conductors due to electrostatic disturbance of the ether received a more general attention.

The static induced current had by this time taken a firm root in practice in America and all influence machines were provided with special mechanical devices for its utilization. In the light of the newer developments, I studied and experimented further, and on December 2, 1890, made a lengthy communication to the New York Neurological Society, pointing out explicitly the enormous rapidity of the oscillations possible and enumerating many novel physiological characteristics. I referred to frequencies of from one hundred millions to twenty thousand millions as possible.

This paper, read December 2, 1890 and published⁵ January 24, 1891, was therefore, an amplification and continuation of my earlier publication of 1881 and still prior to any publication along these lines by D'Arsonval or Tesla. It placed the

modern high frequency current before the medical profession in positive terms and was a plea for attention to it.

Soon afterward followed a publication by Professor D'Arsonval upon high frequency currents, communicated to the Society of Biology, February 24 and 25, 1891.⁶ To produce the D'Arsonval modification, we make use of a static induced circuit solenoid of from 15 to 20 turns, leaving the rheophores and patient as before. See Fig. 5 and Fig. 2.

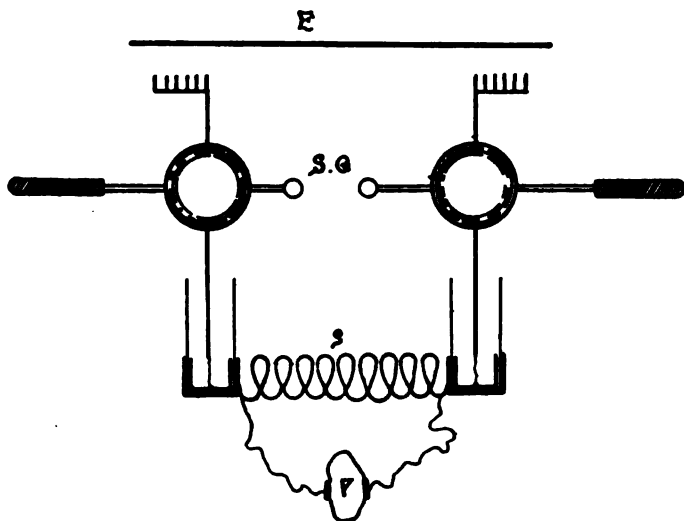


Fig. 5.—D'Arsonval 1891 modification of the Static Induced Current by conveying it through a solenoid shunt circuit. E, Electrical Generator; S, Solenoid; P, patient.

Next followed a publication by Mr. Tesla⁷ in a lecture delivered before the American Institute of Electrical Engineers, May 20, 1891. Mr. Tesla transformed the static induced current upward as in the ordinary induction coil. We may illustrate this by again taking Fig. 2 as a point of departure and adapting a fine wire secondary circuit to the static induced circuit solenoid.

In 1890 Professor Elihu Thomson constructed a machine capable of giving 8000 alternations per second and conducted extensive physiological experiments relating to the actions of high potential high frequency currents upon animal life. This work was published May, 1891.

The splendid achievements of Lodge, D'Arsonval, Elihu

Thomson and Tesla soon placed the high frequency current in a foremost place in electro-therapeutics. The work of Oudin added greatly to this success.

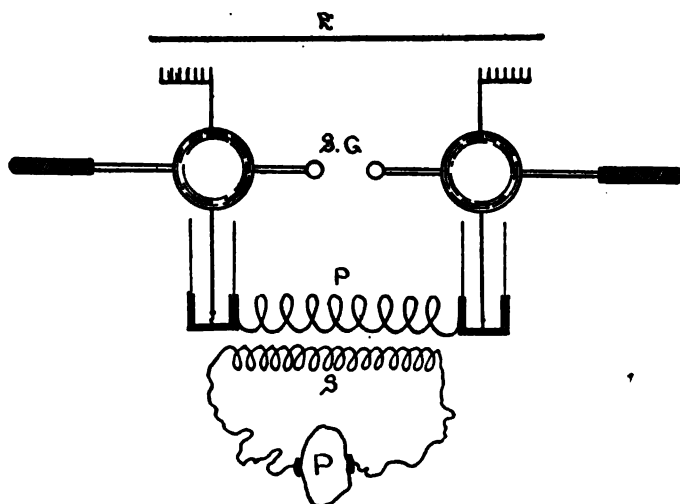


Fig. 6.—Tesla 1891 upward transformation of the Static Induced Current of 1881 and 1891. E, Electrical Generator; P, patient; P, primary; S, secondary.

The wave current came as a later thought but one based upon the foregoing facts. I had practiced it for several years in my laboratory before I published it in 1899⁸ at the solicita-

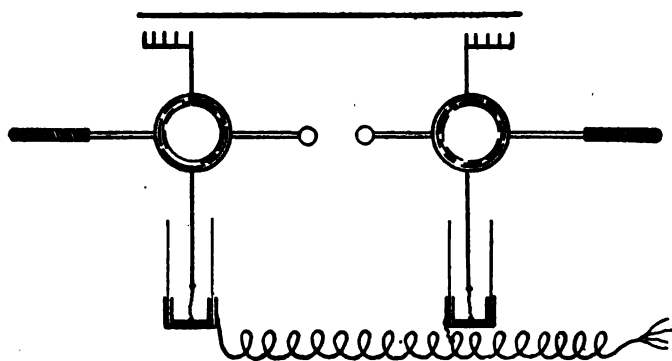


Fig. 7.—The Static Induced Current through a Solemoid. Oudin Solenoid.

tion of my friend and at that time my associate, Dr. William Benham Snow, who recognized what we believed to be its

merits of simplicity, adaptability to influence machines as we use them in this country, and therapeutic action. Full details as to all these points may be found in Dr. Snow's two admirable books^{9 10} upon electrostatic practice.

Fig. 8 illustrates the arrangement.

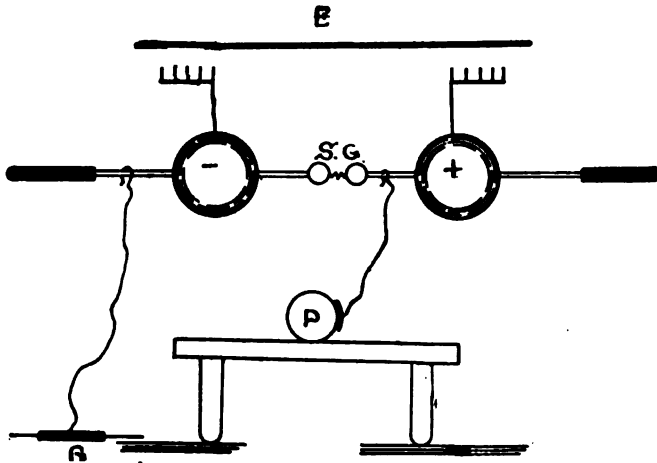


Fig. 8.—*Wave Current*. E, Electrostatic Generator; G, ground connection of the negative side of the machine; E', Electrode connected to patient, P, who must be insulated.

The arrangement is essentially that of a transmitter of wireless telegraphy: one side of the oscillator is grounded and the other is an insulated condenser plate. Such an arrangement may be a radiator as well as an oscillator and thus permit of the radiation of Hertzian waves from the patient's person; hence the suggestion to use the name "wave current."

I will refer to the electrical characteristics of this current by a quotation¹¹ from the Second Report of the Committee on Current Classification made to the American Electro-therapeutic Association:

"One prime conductor of the static generator is grounded; the other is connected with an electrode applied to the patient who is on an insulating stand. The current received by the patient is due to the spark discharge between the knobs of the prime conductors. The patient forms one coating of a Leyden jar condenser, the other coating of which is the earth and surrounding objects and walls connected electrically therewith.

"The greater part of the charge and resulting strain on the dielectric air will be found at those parts of the patient and floor or walls of the room that are nearest together.

"If the spark gap be long, the time of charging by the small continuous current will also be comparatively long, because the potential must be raised to a high point in order to produce a long spark. The duration of the discharge, which will probably be an oscillatory one of relatively high frequency because of the small capacity of the condenser, will be short. The small continuous charging current will flow through the patient without causing appreciable sensation. The sudden oscillatory discharge may flow over the surface of the patient because of its high frequency, and therefore without disagreeable effect. As the length of the spark gap is diminished, the time and amount of charge become less, with a resulting diminution of sensation."

Our influence machines, of the Holtz type, as has been pointed out average from 10 to 20 revolving plates 30 to 34 inches in diameter, whose speed of revolution is about 400 to 600 per minute. There are many machines having 24 revolving plates and one even has been constructed and is in successful operation having 40 revolving plates 32 inches in diameter.

Such machines are provided with a separate and small Wimhurst machine exciter both enclosed in a glass case. Owing to the demand and sales, these machines have been carried to a high degree of perfection as to mechanical details and ball bearings.

As to electrodes, these are commonly, as I at first advised,⁸ cut from a roll of plastic sheet metal called by us "block tin." This metal resembles sheet lead. The operator, provided with this metal, some rheophores and ordinary binding posts which may be fastened to the metal by a screw, cuts his electrode of a size and shape suitable to the case to be treated. Commonly such an electrode has a surface dimension of 2x3 inches. If spinal, its shape will be 1x6 inches, etc. Long strips 1x1 inches are cut to wind about a joint. Or again, a foot plate of the size of the two feet is cut, and so on. Or joints and other parts of the body are wrapped with metallic cloth such as may be purchased at military supply stores. The metals are placed bare upon the bare skin and held in place by the clothing, by a

bandage, held by the patient by a loop exerting pressure. Again the electrode is a sheet of metal placed upon an insulated couch or chair or upon an elongated table in which case the sheet of metal may be covered with glass. For large machines giving, of course, a large output, this latter method is extremely useful in arterio-sclerosis, tuberculosis, gout, in short for all the ordinary constitutional and general treatments now familiar in ordinary therapeutics. The smaller type of electrodes comes in play for local troubles as of joints, organs and in neuritis. Vacuum electrodes and pointed electrodes to secure the effluve are in common use. With such electrodes we often use a large fine wire solenoid connected in series to raise the potential. A muffler is generally used to mitigate the noise of the sparks at the spark gap.

The current may be modified to produce gentle, painless and diffusive muscular contractions or not, as desired. It is obvious that each spark passing may represent such a contraction; and these are often desirable.

If the resistance of the spark gap is diminished the frequency is augmented. The spark should pass in a well sustained and (to the eye) continuous stream.

It is a grave question, however, if too much stress has not been laid upon *very* high frequency and upon the necessity that the type of current should be strictly oscillatory. As to this point I quote from the Third report¹² of the Committee of the American Electro-therapeutic Association as follows:

"Therapeutic Value of High Periodicity Pulsatory Currents. Inasmuch as the physician has been generally unable in the past to determine with certainty whether the currents applied by him to a patient were oscillatory or pulsatory, or perhaps oscillatory currents so rapidly damped as to be practically pulsatory, as in the case involving easily possible clinical conditions in the application of the Morton wave current, illustrated in Fig. 7, the inquiry is pertinent whether, after all, the therapeutic value of discharge currents from a condenser depends upon their being oscillatory in character?

Without doubt, what have heretofore been referred to by medical writers as high frequency *oscillatory* currents have been, in many cases, high periodicity *pulsatory* currents, due mainly to the high resistance of the circuit: and the additional

inquiry is timely, whether the latter class of currents may not be credited with as great curative properties as the former, particularly when the immediate effect of either current is to alternately charge and discharge the patient (in whole or in part, depending upon the location of electrodes) as one plate of a condenser; the result of which is a succession of mechanical attractions or pulls between the patient and the floor and walls ordinarily constituting the other plate, which act synchronously with the charges and discharges, and produce a mechanical massage which is apparently of a penetrating character, acting upon each individual cell of the living tissue?

If the therapeutic value of condenser discharge currents is due to a massage effect, then why are not pulsatory currents or high periodicity as efficacious as oscillatory currents of high frequency, when the *rate* at which the patient is alternately charged and discharged is the same in both cases, that is, when the patient is subjected to the same number of current pulsations and accompanying massage effect in a given time, it being understood, of course, that such an adjustment of apparatus and circuit conditions is made that substantially equal massage effects are produced in both cases?"

We shall welcome such suggestions as may come to us in relation to the practice of the wave current, for the reason that almost every medical operator of an influence machine on this side of the Atlantic uses this current.

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2. La Théorie de Maxwell et les Oscillations Hertiennes. La Télégraphie sans fil par H. Poincaré. Gauthier-Villars, Editeur, Scientia No. 23, pp. 44, 59.
3. Report of the Special Committee on the Static Induced Current. William J. Jenks, M. A. I. E. E., and William J. Herdman, M. D. Appointed at the Tenth Annual Meeting of the American Electro-Therapeutic Association, September 27, 1900, p. 29.
4. Lightning Conductors and Lightning Guards, Oliver T. Lodge, D. Sc., F. R. S., Whittaker & Co. Lectures, etc., by Sir Oliver Lodge, F. R. S., Archives of the Roentgen Ray, July, 1904, pp. 42, 43.

5. The Franklinic Interrupted Current. Static Induced Current. Read before the N. Y. Neurological Society, December 2, 1890, and published in the N. Y. Medical Record, January 24, 1891.

6. Exposé des Titres et Travaux Scientifiques de Dr. A. D'Arsonval, Paris, Imprimerie de la Cour D'Appel, 1894, p. 53.

7. The Inventions, Researches and Writings of Nikola Tesla. By T. C. Martin, The Electrical Engineer, New York, 1894, p. 119.

8. Bulletin Officiel de la Société Française d'Electrothérapie, January, 1899; and the Electrical Engineer, Vol. 27, pp. 245-246, N. Y., March 2, 1899.

9. A Manual of Electrostatic Modes of Application, etc., etc. By William Benham Snow, M. D. New York, A. L. Chatterton & Co.

10. Currents of High Potential, of High and Other Frequencies, by William Benham Snow, M. D. New York, Scientific Authors' Publishing Co., 1905.

11. Second Report of the Committee on Current Classification and Nomenclature, read before the American Electrotherapeutic Association, September 24, 1903, p. 37. W. J. Jenks, M. A. I. E. E., Chairman.

12. Third Report of the Committee on Current Classification, etc. Read before the American Electro-Therapeutic Association, September 15, 1904. Professor Samuel Sheldon, Messrs. W. J. Jenks, Chas. L. Clarke, and Professor Elihu Thomson.

The above article, admirably translated by Dr. H. Bordier, appeared in the Archives d'Electricité Médicale of March 10, 1908. We append in our turn a translation of a footnote to this article added by Dr. Bordier.

"The interesting foregoing memoir proves clearly the priority of the works and of the publication of Dr. W. Morton concerning the currents of high frequency: it is certain that with his arrangement of 1881 he produced high frequency employing a static machine in place of the induction coil as was later employed by E. Thomson, Tesla, and D'Arsonval. I may perhaps remark that I have proposed (Archiv. d'Elect. Méd. June 1900) to give the name of Hertzienne Franklinisation to the form called by W. Morton the static induced current, this term easily comprising and replacing, as it appears to me, advantageously the terminology of 'Morton currents' or of 'static induced current.' Furthermore those authorities who have published either books or articles on Electro-therapeutics appear to have adopted the denomination of Hertzienne frank-

linisation to designate the application of the static induced current of Morton.

"As regards the term 'wave current' I have shown in the last number of the Archives that it would not appear to be useful to introduce it into medical electrology since with it there is produced the *médiat* (indirect) excitation of muscles or of nerves covered by the electrode. It is, therefore, the *médiat* spark (indirect spark) that is employed when the machine is arranged as indicated by Dr. Morton (Fig. 7). And it would seem that it is not necessary to create a new word. Franklinisation with indirect sparks would appear to be a much better term to designate this electric modality whatever may be the opinion held as to the oscillatory or non-oscillatory character of the discharge under these conditions.

"As I have said concerning the interview reported by M. Gallot and as W. Morton recognizes, at each spark jumping between the balls forming the spark gap there is produced a contraction of the muscle excited. It is a tetanic contraction of the muscles which appears at that moment, always by the indirect excitation, exactly as would take place with a *mediat* exciter (Dr. H. Bordier, *Précis d'Electrothérapie*, pages 156, 157, 158, Paris) (of Roumaliac, of Bergonié, of Morton, etc.) the machine being arranged exactly as for simple franklinisation.

"However this may be we should be recognitious to Dr. Morton for having so well indicated this form of franklinisation made directly with the machine arranged as he was the first to describe. Static electricity with us, as well as in America, is thus rendered capable of furnishing a much greater number of therapeutic applications" (Dr. H. Bordier).

"[Note by Editor. "Franklinisation with indirect sparks" referred to above by Dr. Bordier refers to that form of indirect application of the spark first devised by Dr. Morton in 1881 and published continually since that date in various articles, books and catalogues as the "Pistol Electrode." Cuts of this electrode will be found in J. & H. Berge's catalogues of electrical instruments of 1881, '82, and '83, and a complete description of the electrode and the method of application is given in Dr. Ambrose L. Ranney's book entitled, *Lectures on Nervous Diseases*, Philadelphia, F. A. Davis, Publisher, 1888, and by Dr. Morton, article *The Franklinic Interrupted Current*, N. Y. Medical Record, January 24, 1891, and in many other books.]"

THE GENERAL PHYSIOLOGICAL AND THERAPEUTIC ACTION OF HYDROTHERAPY.*

BY CURRAN POPE, M. D.,

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Hydrotherapy traces its origin to the mists of antiquity; was in ancient days closely allied with the mysticism of religion, saw its days of magnificence under the Roman Emperors and languished during the dark and barbaric Middle Ages, the prey of the quack and charlatan. It rose and fell, like the tides of the sea, until William Winternitz, the modern master, placed it upon its present permanent physiologic basis. Since that time German, French, English, Italian and American investigators have added to our quota of knowledge. Its marvelous adaptability, the extent of its physiological action, and its therapeutic power have placed it in the permanent archives of the modern therapeutician.

Water is found universally and is a part and parcel of mankind's daily necessity. Its temperature range is wide, varying from the vapor of steam to its crystalline state—ice—a range of some 150-165° F. (65-73 C). It absorbs heat and cold rapidly and in return rapidly loses its temperature content to the body with which it comes in contact, making it the agent par excellence for the application of thermic changes to the external surface of the body. Besides possessing a cleansing, antiseptic action, water by its own weight, when under atmospheric pressure, enables the hydriatist to produce mechanical effects of varying degree, thereby influencing the

* Read at the Meeting of the International Physio-Therapeutic Congress II, at Rome, Italy, November, 1907, and at the Sixteenth Annual Meeting of the American Electro-Therapeutic Association at Boston, September 18, 1907.

peripheral nerve terminations. The ease and rapidity with which this agent may be changed and varied in a precise and certain manner, so that the attendant has under his control within a few seconds of time the temperature, pressure, form of application and duration, render it without question the ideal remedy for these effects. It is adaptable to any, and all portions of the body with a precision and satisfaction offered by no other agent. Besides the undoubted scientific value of water as a physiologic-therapeutic agent, may be mentioned its easy accessibility and economy.

The physiological action of hydrotherapy is co-extensive with the tissue and functions of the human body and its responses may be made general or local, according to the extent and location of the application. These results vary according to the method of application, its extent, the duration, temperature, mechanical effects, and such procedures as precede and follow the treatment. Taking a normal or "neutral" line (94-96° F.), temperature effects are produced as we rise above (warm, 96-98° F.; hot, 98-104°.; very hot, 104° and above) or fall below (tepid, 92-80° F.; cool, 80-65° F.; cold, 65-55° F.; very cold, 55-34° F.) this line. The characteristic of the neutral zone is the suppression of thermic stimuli the cessation of cutaneous impressions, sedation and nerve rest. Above and below this line, the perturbations of the sensory nerve endings are conveyed to the central nervous system, giving rise to myriads of minute impressions, the registration of thermic changes with their resultant effects both general, local, reflex, and transferred. The system rallies to meet the changes, responds to its fullest ability to throw them off or counteract their effect, and we then have those wonderful and intricate phenomena known as "reaction," more marked in its response to cold than to heat. The alternate application of heat and cold accentuates the response to each, where the application is made in proper ratio. In the short limits of this monograph generalities can only be indulged owing to the extent and complexity of the subject.

Upon Temperature of the normal body, heat may cause a rise from one-half to one degree, according to the author's personal experiment. This is rapidly counteracted in the normal individual by the outburst of perspiration, radiation of heat and heat loss through evaporation. The phenomenon is accompanied by increased vascularity, sensitiveness and

reddening of the skin surface due to dilatation of the blood vessels. The immersion in a bath moderately warm may elevate temperature by the mere prevention of heat elimination. The primary effect of cold is to produce refrigeration, pallor, and chilliness of the skin surface accompanied by contraction of the capillaries. In the normal individual cold water causes muscular contractions, which produce heat and, if the application is short, the system responds so promptly that no practical reduction in temperature takes place. In febrile states immersion in a cold bath reduces temperature as Winternitz has shown, when accompanied by sufficient vigorous friction to dilate the peripheral blood vessels. In many delicate and chronically diseased individuals cold may act as a depressant of temperature unless care is taken to proportionate the coldness of the water to the reactive power of the individual. Colder temperatures can be employed with less discomfort where mechanical stimulation is combined; for instance in the douche.

Upon the Circulation.—Heat temporarily slows the heart action, increases the force of the pulse, giving way rapidly to a quickened action of both and accompanied by dilatation of the surface blood vessels, reddening of the skin, lowering of arterial tension and perspiration. Mechanical stimulation during the application of heat increased the effects reflexly. The internal blood vessels are contracted as the quantity of blood is relatively fixed. Cold is more decisive and rapid in its action than heat. It slows the heart's action, increases the rate of the pulse and raises arterial tension. The blood vessels contract, driving the blood from the surface, causing the skin to become pale and slightly shrunken. When reaction takes place the blood vessels again moderately dilate in what might be described as "a tonic state," so that the general vascularity of reaction following the cold application resembles closely the healthy condition of cutaneous circulation. Most of the results of thermic mechanical stimuli upon the blood vessels are brought about more through reflex action than by any other means, as has been clearly demonstrated by both Schueller and Neumann. It may be noted here that the application of heat, followed by cold, produces a pump-like action beneficial in overcoming congestions or stases in any part of the body.

Upon Respiration.—Heat increases the average number, lessens their depth, diminishes oxygenation and CO₂ elimination. Where the heat is inhaled these effects are more rapidly produced. Cold when suddenly applied produces a spasmodic expiration, deep inspiration, greater amplitude of respiration, increased absorption of oxygen and elimination of CO₂ in the pulmonary capillaries. After reaction the respiration still remains deeper, there is an experienced sense of relief and fullness of the lungs.

By Metabolism, we understand all those varied changes that take place in the tissues resulting in the appropriation of food, and the elimination of waste products by means of which in the normal individual a balance is maintained. Metabolic changes are brought about by the varying action of secretion, absorption, tissue upbuilding and down breaking and excretion. A balanced metabolism evidences an input and output that is just sufficient and proper to meet all the demands of functional activity, repairing of waste, furnishing sufficient force, heat, and to remove the results of tissue waste. It must not be forgotten that an essential part of this process is the absorption of oxygen for oxidative processes. The great channel by which the pabulum is conveyed to the tissues and the detritus removed from them is the blood which, as is well known, is the agent so necessary to the reparative process. Metabolism of tissue may be influenced by (1) activity of function brought about by an increased quantity of blood circulating through the organ or tissue; (2) by change in the composition of the blood in which the presence of increased oxygen stimulates oxidation and tissue change; (3) by increased blood pressure causing more blood to pass through the capillary walls and thus favor nutritive changes; (4) by elevating the temperature of the tissues; (5) by influencing the nervous system, especially the vasomotor and trophic nerves which regulate the capacity of the tissues for absorbing nutriment. Close clinical and some experimental observations have taught me the influence that heat and cold have upon the metabolism of the human body.

I have learned that in their effect upon metabolism they differ rather in degree than in-toto. Heat acts in less degree than cold. Its effects are less likely to be permanent; it enhances the more powerful effects of cold, where it precedes.

Cold water has a direct positive and unquestioned influence upon all metabolic activity. Tersely stated, we may say, that under hot and cold water applications that we can expect a greater absorption of oxygen and elimination of CO₂; increased quantity and better character of bodily glandular juices; destruction of waste material, the rendering of toxins innocuous; the rejuvenation and cleansing of tissue of such a nature as to, in a physiological sense, cause the individual within his tissue to be "born again." These results are brought about by the influences above noted through the action largely of the nervous and circulatory system.

The Nervous System has its outposts distributed to every atom of the cutaneous surface. These terminals are connected intimately with one another, with the spinal cord, the great basal ganglia and brain, so that any impression travelling from the periphery influences each one of these so called "levels." This is literally "a harp of a million strings" upon which may be played the harmonies of health. By means of these nerve terminations the Master may play upon a gamut of sensory impressions and secure almost any physiological and therapeutic result imaginable, provided the integrity of the tissue has not been completely destroyed.

Upon it we depend for all the distant influences in organs and tissues remote from the surface; and by hydrotherapy, as has been aptly expressed, we may make the overseers, the nerves, guide and direct the cells which are the artisans in the organic workshop. The nervous system in its response to thermic and mechanical stimuli responds by acting upon the circulation, through the vasomotor system; upon secretion, through the secretory nerves; upon trophic action, through the trophic nerve and inhibits through its inhibitory nerves. It must not be forgotten that the sympathetic system with its many ganglia, with its abdominal brain and many other plexuses may be controlled and manipulated so that the vital activities are rearranged and brought in harmony with the rest of the system for sympathetic nerves, presiding as they do especially over the so called "vegetative processes" of the body, may be made to contribute its quota of physiological response.

Neutral Temperatures 94 to 96° shut out impressions upon the cutaneous surface and by increasing the retention of water within the skin produce a succulency of nerve endings that

result in sedation, a lessened irritability and a lack of stimulation. Heat relaxes the tissues, relieves pain due to spasm and increases the sensitiveness of a part when locally applied. The influence of a general hot application upon the nervous system is to produce oppression, excitation and a lack of vitality, which when carried too far may approach prostration.

Cold generally applied and where graded properly to the individual is in its action upon the nervous system, above everything else, a tonic. Its action is enhanced by mechanical effects and after proper application there is not alone increased physical vigor but mental as well which, when repeated, will result in overcoming nerve exhaustion, irritability, weakness and a long train of psycho-somatic symptoms generally termed neurasthenia. It is to be regretted that the busy, overworked, nerve-strained, mentally worried and oppressed individuals of this strenuous age, do not turn with more frequency to the beneficial and restorative properties of cold water, rather than to the brain-obtunding, nerve-destroying and health-dissipating drugs and opiates, that simply anesthetize the nervous system rather than remove the products of waste and which, where they are the result of fatigue, may become in turn the cause of disease.

Upon Muscular Tissue both of the striated and non-striated varieties hot and cold applications have a decided and rapid action. Heat relaxes normal and overcomes spasmodic states while at the same time it produces an enervation, the result of its general relaxing and atonic action. This is true in so far as tepid, warm and ordinary hot baths are concerned. Very hot baths, such as are constantly employed by the Japanese and which Occidentals stand poorly, have a very stimulating, revivifying and tonic effect resembling in this respect cold applications. Mosso by means of his Ergograph and also Vinaj and Maggiora have absolutely demonstrated the fact that cold applications in health as well as in fatigue and pathological states increase muscular activity fully one-third. This enormous increase is taken advantage of by athletes, especially the prizefighter, who always has his cold shower and rubdown prior to entering the squared arena. These statements apply to the brief application of cold water followed by reaction, for where cold applications are long continued muscular irritability is lessened and lassitude produced.

That cold may act in a reflex manner upon the internal viscera is frequently evidenced by the fact that a general cold application or even an application to the feet alone may produce evacuation of the bladder. It is a common clinical observation that the application of cold water to the abdominal surface causes contraction and stimulation of the structures of the intestines and is one of the most satisfactory measures at hand to stimulate secretion and overcome atony and constipation. Upon the muscular structure of the heart cold reflexly influences its action, decreasing its frequency, slowing the pulse and increasing arterial tension. Where used in conjunction with carbonic acid gas as in the Nauheim Baths it decreases the area of dullness in the dilated and atonic heart and by the increase of its activity brings about a physical hypertrophy. For these reasons alone hydriatic methods are among the most valuable means of toning the neurotic and muscularly fatigued people of this strenuous age.

Upon the blood hydrotherapy has a marked influence which I have determined by a large number of personal experiments. It influences both the hemoglobin and corpuscular content as has been noted by Prof. Winternitz. Heat stimulates leucocytosis and favors somewhat the elimination through skin and kidney but it is as a rule very little beneficial upon the general reconstruction of the blood. Cold, on the contrary, is one of the most valuable means we have of increasing the quantity of hemoglobin and at the same time its oxygen-carrying power. As we have heretofore shown the respiration is deepened and larger quantities of oxygen enter the circulating blood. At the same time the cold drives into the circulation the corpuscular elements that have lain dormant in the interstices of tissues and thus adds a quota to the thickness and composition of the blood. Hot applications diminish, cold increases the alkalinity as well as the density or thickness of the blood stream, as demonstrated by Strasser. As a natural corollary to the above, we find that normal oxidative process and normal terminal waste materials are better prepared and therefore more quickly eliminated under these influences.

It may be stated that following the application of cold, the well-known "therapeutic reaction" must be attained and that unless this is secured, save in the case of febrile diseases, the object aimed at has been defeated and the application robbed

of its more pleasant and beneficial features. Re-action is co-extensive with the structures of the human body, every tissue, cell and function feeling its influence so that the individual is strengthened, has a buoyancy and activity both mental and physical to which, in many instances, he has long been a stranger.

Judgment, tact, and a comprehensive knowledge of the particular case reduces the contra-indications to a minimum, but we may say that very hot and very cold baths are as a rule administered with caution in the extremes of life, youth and old age. Delicate persons must be trained and, where this is done with care, very little risk is entitled. Cardiac, vascular and similar diseases demand caution.

General Therapeutic Application.

To attempt within the brief limit of this monograph to describe the general therapeutic uses of water is a physical impossibility, for its range is so extensive that it practically embraces the entire domain of curable diseases and disorders. It does not even stop here but may be employed to ameliorate the symptoms of organic incurable disease, a notable example of which, among the scleroses of the spinal cord, being locomotor ataxia. We may, however, profitably consider certain groups in which it is most valuable. The acute infectious diseases, typhoid fever being par excellence the type, offer opportunities for the application of hydriatics with the promise of unsurpassed and unequalled results. In these diseases the bath of Brand, a full bath at 65° F. accompanied by friction still holds the first place, but many practitioners have found that the grim monster can be held at arms' length by simpler and easier applied bath methods. To those practitioners who fear to use what they term "heroic measures" may be recommended in these febrile disturbances the cold sponge, and cold compress applied over the abdomen. The sponging should be done with a rough or crash rag in order that sufficient friction be developed to produce a cutaneous dilatation of the blood vessels, while at the same time we obtain the thermic impression of the cold water.

In acute inflammatory disease of the viscera, of joints and soft structures we may expect relief of pain, comfort and speedy dissipation of the disease where hydrotherapy is intel-

ligently and properly applied. In these inflammations the author has secured signal results from the fomentation applied at a temperature of 140 to 160° F. followed by the cold or stimulating compress or by the partial or half pack at a temperature of 65° F. for periods ranging from one-half to three hours, at which time the compress may be again repeated.

In tuberculosis its effect is wide reaching, stimulating the appetite and capacity for food, increasing glandular secretion, digestion and assimilation, and by raising the leucocyte count and opsonic index favors destruction of the bacilli and a repair of tissue. In conjunction with fresh air and proper food it helps to form a tripod upon which the therapeutician may lean with comfort and assurance, provided the tubercular process has not gone too far.

But in the domain of chronic disease no matter where located we may expect with a reasonable degree of certainty that this agent will more quickly and more certainly relieve the patient than any other single weapon that we have at command. Seventeen years in the treatment of this class of patients leads me to state that many diseases otherwise unamenable to ordinary measures may yet be certainly and promptly relieved by its intelligent, careful and persistent application. To properly speak concerning its manifold powers in the treatment of these diseases would be to pass upon it a panegyric that would in its eloquence consume too much of this Congress' time and patience.

Conclusions.

(1) An ancient measure, universally found possessing cleansing, antiseptic, thermic and mechanical powers.

(2) Its physiological action upon the human body is largely brought about through its disturbing influences of temperature and mechanical effects on the peripheral sensory nerves.

(3) Brief applications followed by reaction do not particularly affect temperature, though temperature reduction may be best brought about by immersion accompanied by friction.

(4) The circulation is increased on the surface by heat, is accompanied by dilated blood vessels, quickened heart action and lowering of arterial tension. Cold contracts the surface blood vessels, slows the heart's action, decreases the pulse rate

and raises arterial tension; is followed by reaction with moderately dilated blood vessels.

(5) Respirations are increased in number, lessened in depth and oxygen and CO_2 diminished by heat. Cold on the contrary increases the amplitude and depth as well as the absorption of oxygen and the elimination of CO_2 .

(6) Metabolism in all its phases is effected by hydrotherapy, less in degree in the case of heat than with cold. As a tissue up-builder, tonic, stimulant, eliminant, depletive it is unequalled.

(7) Upon the nervous system, the direct action of water through its thermic and mechanical effects is conveyed to the center and there reflected in a thousand-fold way, producing results both tonic and sedative that make it a true nerve re-structor.

(8) Muscular tissue is relaxed and enervated by heat; stimulated, revived and toned 33 1-3 per cent. by cold.

(9) The blood is changed, leucocytosis induced, opsonic index raised, purification promoted, hemoglobin increased, corpuscles enriched and the alkalinity made greater by these applications.

(10) Its therapeutic field is wide in the acute infectious diseases, inflammations and toxemias. It is the best single therapeutic weapon in chronic diseases and disorders.



CANCER AND ITS TREATMENT BY CATAPHORIC
STERILIZATION.

BY G. BETTON MASSEY, M. D.,

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(Continued from page 204.)

The Active Electrodes.—In the development of the cataphoric treatment of cancer the author was accidentally led to employ zinc coated with mercury as the material for the soluble electrodes. It was later found that pure mercury could be diffused as an ion from electrodes of pure, or 18 karat, gold, the mercury being temporarily united with the gold by amalgamation, and that with heavy currents the mercury would disappear so rapidly from the gold instrument that provision had to be made for an extra supply by injecting it into the tissues in immediate contact with the instrument through a tunnel in the latter. The gold was never acted upon itself by the current, and when the supply of mercury and the alloys in the gold were diffused it remained as an unattackable electrode.

Comparative tests of pure mercuric cataphoresis from these gold electrodes and of the mixed zinc-and-mercury cataphoresis from pointed zinc instruments showed later, nevertheless, that the latter were more effective in necrosing results and equally good in sterilization. The pointed zinc instrument merely coated with mercury was also a more controllable instrument than the pointed cannulas of gold, which required the presence of additional liquid mercury, the latter being kept in the place desired only with much difficulty at times. The result has been that the zinc-mercury instruments are exclusively employed at present.*

Minor Application Electrodes.—The minor electrodes, shown in the upper portion of Fig. 15, are furnished in sample only by the manufacturers, as they are readily made by the surgeon or an assistant, and the shape and length are largely determined by the particular case, or even the stage of the

* For a description and illustration of the gold-mercury electrodes see the author's work "Conservative Gynecology and Electro-Therapeutics," Fifth edition, F. A. Davis Co., Philadelphia, 1906, p. 218.

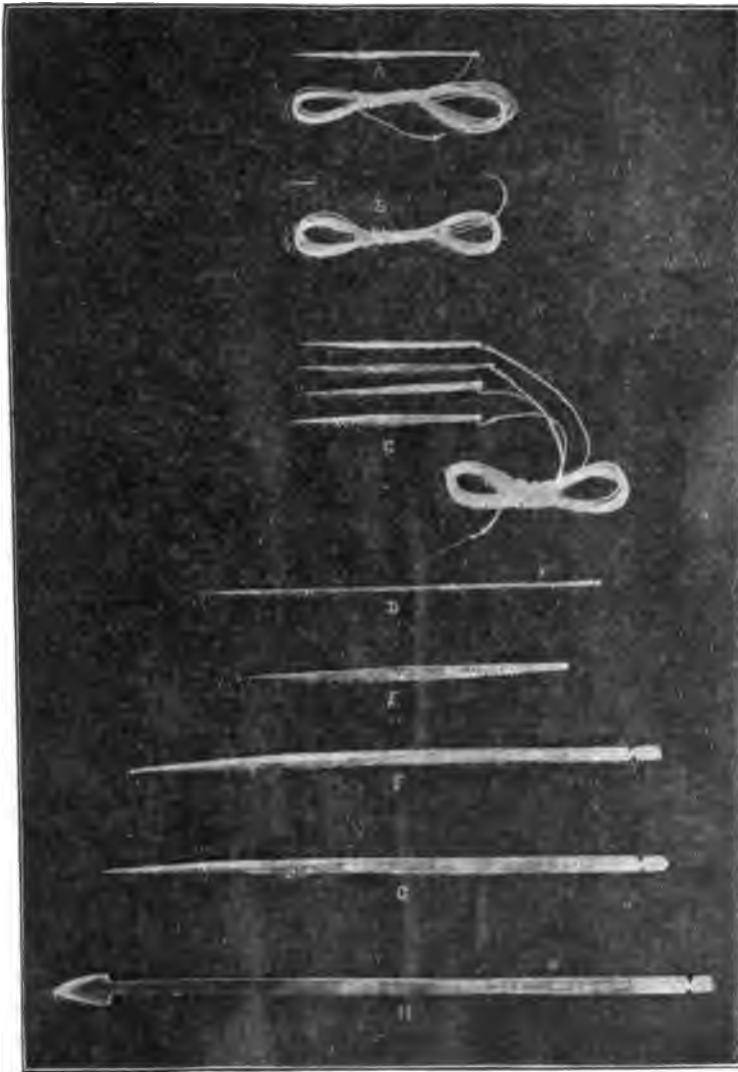


Fig. 15.—Author's Zinc-Mercury Cancer Electrodes (one-half natural size).
A. No. 1, Minor electrode. B. No. 2, Minor electrode. C. Leash of medium-size external electrodes. D. Minor mouth, uterine or rectal electrode, uninsulated. E. Major breast or external electrode. F and G. Major mouth, uterine or rectal electrodes. H. Spade-pointed major uterine or rectal electrode. (Procurable of Williams, Brown & Earle, Philadelphia.)

case, in which they are used. These electrodes are also those that are advised in the treatment of tubercular glands of the neck or other accessible tubercular cavities or nodules.

The electrode is cut from sheet zinc of a thickness of 1-64 inch (approximately $\frac{1}{2}$ millimeter), being the thickness largely used beneath stoves, etc. A long-handled pair of surgical scissors enables the metal to be cut easily into slivers, though tinners' shears of superior steel are better, the slivers being about $1\frac{3}{4}$ inch ($4\frac{1}{2}$ centimeters) long and $\frac{1}{8}$ inch (4 millimeters) wide at the butt end, tapering to a fine point, well sharpened by filing. A suitable length of No. 32 cotton-covered copper wire is then prepared to act as the conductor for the current by baring a short portion at each end. One bared end of this wire is wrapped tightly about the butt of the electrode and clamped firmly in place by turning the end of the electrode over it with a pair of pliers. The instrument is then complete as an uninsulated, or No. 1, minor electrode. Immediately before insertion into the growth the active tip is amalgamated by dipping it for an instant in weak sulphuric acid, into metallic mercury, and into plain water, in turn.

The No. 2 minor electrode is a similar instrument coated with insulating wax except at its tip. This is done by gently heating it over a Bunsen burner or alcohol lamp and at the same time melting the end of a stick of sealing-wax and fusing the latter in an even coat over the non-active portions of the electrode. The result is an exceedingly delicate instrument for applications beneath non-diseased edges and in cavities, the insulation limiting action to the part desired.

The fine wire advised as a conductor of the current is selected for mechanical reasons, such as the dragging weight of a heavy wire on the electrode, the instrument itself being too light for the heavier conductor. Its conducting power is more than ample for any currents capable of being employed with these electrodes. A further precaution to ensure against the added pain caused by any motion of the instrument from accidental movements of the patient is the expedient of applying a steadying guy to the wire near its attachment to the electrode; this is done by attaching a small piece of adhesive plaster to the wire near the electrode, and sticking the ends of the plaster to the skin of the patient in such a way that the wire will not touch the skin. This arrangement will per-

mit the patient to move at will during a prolonged application without disarranging the electrode.

These electrodes may be employed as *multiple points* in a major application when a large surface of moderate depth is to be sterilized. For this purpose a leash of conductors is prepared by cutting from four to a dozen short lengths of No. 32 or 30 wire and attaching their bared ends to the bared end of a longer length of No. 26 wire, which is attached at its other end to the positive binding post. The point of junction of these wires, after being tightly twisted, is carefully insulated by covering it with a small piece of adhesive plaster. A dozen such points can stand a current of 20 milliamperes per point, or a total of, say, 250 milliamperes, during a prolonged application, thus conserving time in the treatment of a broad surface growth.

The instruments described above, and the smaller ones of those described below, should be used once only, and then discarded as too brittle for further work.

External or Breast Electrodes.—With the exception of the minor electrodes just described, the remaining zinc-mercury electrodes are primarily intended for the major application, though the smallest external size may at times be advantageously used in a minor one. These electrodes are made from either 1-32 inch (1 millimeter) plate zinc, in which case they may be cut by the surgeon or his assistant by means of a pair of tinner's shears, and attached to No. 28 wire in the same way as mentioned for the minor electrode; or they may be made of still heavier zinc 1-16 inch (1½ millimeters) thick; in the latter case being procured from the manufacturers or other artisan, and being attached to No. 28 conducting wires by the latter being wound tightly about a neck filed near the butt of the electrode. In width these electrodes vary from 3-16 inch (4 millimeters) to a fine point, and in length from 3 to 5 inches (8 to 12 centimeters). It is at times useful to cover the butt end of these electrodes with fused sealing-wax to protect the wire joint from the action of the mercury, which would make the wire brittle. This makes a convenient handle also. No. 28 wire is the most suitable size for the shorter lengths of this weight of electrode. Each electrode is usually attached to a single conducting wire, or, when a large growth is to be attacked, from

two to six of the same length may be attached to a leash of wires as described in the last paragraph. They should be bent to the curve desired, if a curved instrument is needed, before amalgamation.

Mouth and Throat Electrodes.—The longer lengths of the electrodes just described are also suitable for use in cavities, not deeply situated, if the fused wax insulation is carried over the whole instrument except the centimeter or centimeter and a half at the active point. Any shape desired may be given the instrument before insulating it, whether curved on the flat or edge, the latter shape being suggested by Dr. Amédée Granger of New Orleans, who points out that sharply pointed instruments have the advantage in mouth operations of being self-sustaining when properly curved. Attachment to the conductor may be made by a spring socket, as in Fig. 16, or, as



Fig. 16.—Major uterine electrode, insulated.

more recently preferred by the writer, by a suitable length of No. 26 wire attached tightly to the butt by wrapping and twisting.

Cervical and Rectal Electrodes.—A minor application may be made to the cervix uteri of as much as a hundred milliamperes by the use of an electrode similar to those advised for the mouth and throat, though somewhat longer, made of the middle thickness of zinc described above and properly insulated.

In a major application to the same parts the active tip must be made larger owing to the tendency of overheating when a heavy current is confined to a small area of active surface, hence the selection of the pointed, spade-shaped electrode shown in the cuts when but one instrument can be used at a time. Like all the instruments, it may be bent at any angle desired before amalgamation.

(To be continued)

Editorial.

CREDIT TO WHOM CREDIT IS DUE.

WE are publishing in this issue of the Journal a paper by Dr. Wm. James Morton, a translation of which was recently published in the Archives d'Electricité Médicale, with a translated foot-note by Dr. H. Bordier, who translated Dr. Morton's article for the Archives.

The genesis and the evolution of the modern high frequency current, as outlined in Dr. Morton's article, proves beyond question his priority as to the invention, publication and introduction into medical practice of this current. His article proves furthermore, by showing the exact similarity of the static induced current to the oscillator of Hertz, subsequently invented, that if the latter produces high frequency currents then the former does, since the static induced arrangement and the oscillator of Hertz are one and the same thing, in short that the static induced current under proper conditions is most positively a high frequency current. As will be seen furthermore by comparing the diagrams, the static induced arrangement is fundamental to all of its modifications and is itself fundamentally the high potential, high frequency current of modern practice. These points cannot be disputed and the credit of the invention and introduction of high frequency currents into medicine belongs, beyond any manner of question, to Dr. Morton. His article shows also that the Lane electrometer method of Cavallo and others and the static induced current method are not identical.

This paper seems, however, to have raised a new controversy, instituted by Dr. Bordier as to the priority and choice of term to designate the static *wave current*. In this Dr. Bordier makes his second effort to affix the term "Hertzienne Franklinization" to the static induced current discovered by Dr. Morton and published in 1881. In the same paper he acknowledges Morton's priority but would use the term "*Hertzienne*" instead of *Morton* Franklinization. Such preferences are not only unfair, but distinctly show a disposition to detract from Dr. Morton's priority in points of discovery and nomenclature. He further asserts that the term "wave current" is not useful as expressing the name of the current in question, but would substitute an ambiguous term which refers to an additional apparatus and inconvenient method, whereas the wave current

is a change of arrangement of the static apparatus with distinctive essential features including the employment of electrodes adaptable to all parts—a method both different in arrangement and principle of action.

As a matter of fact, mediate (indirect) excitation may be induced by nearly all of the static modalities—by any of the modalities which induce muscular contraction.

The terms wave current and static induced currents have been adopted by the Committee on Current Classification and Nomenclature of the American Electro-Therapeutic Association, and will at least on this side of the water, and we believe by all fair-minded confrères abroad, be the term by which this current will be hereafter designated. In short, why not Morton's Franklinization in preference to Hertz's Franklinization, since Morton's work long antedated Hertz's?

The critic also asserts elsewhere that the wave current is a convenient method of application not requiring the operator's attendance during the administration.

It would seem that the argument against terminology and distinct difference of modality would not bear technical scrutiny, as the differences are too distinct to warrant any difference of opinion whatever.

Furthermore, some of our French confrères, while considering the modalities, seem in some of their literature to have failed oftentimes to grasp the greater significance of the *effects* of these high potential, highly diffusive modalities which induce contraction, as playing a distinctly important rôle in therapeutics; for after all, it is not so much the *modality* and the *priority* and preference of nomenclature, as the value of the modality in the induction of some newer distinctive therapeutic result, the importance of which in this instance our confrères seem to have but partially grasped. When they do realize, however, how important the influence of these modalities are in removing what must ultimately be recognized by all as the obstacle to the recovery of inflammatory processes, *local stasis*—the condition which furthers or causes chronicity in most if not all inflammatory conditions—they will accord this modality an important place in the therapeutics of both acute and chronic disease.

* * *

ATTENTION TO THE INTERIOR OF THE CASE OF THE STATIC MACHINE.

AT this season of the year when we have all grown careless of our machines on account of the long continued winter season with dry air, the operator should take warning lest he be caught napping on some humid day in April, and is unable to excite his machine. In this connection it might be said

that at this season of the year, is the best time if possible to have the static machine renovated and reshellacked, in order that it will give as little trouble as possible during the summer months; because a static machine that is constantly operated, from the presence of the nitrous acid constantly evolved within the case, is certain to deteriorate; and the machine used much is certain to require renovation at least once in two years. It may be best to again call attention to the choice of means for keeping the interior of the case dry, and we would in this connection repeat, that calcium chloride is, of all substances, the most unsuitable hygroscopic material that can be employed in the case; particularly the commercial article. The writer still believes that there is no material as good as the ordinary commercial *quick-lime*, hard and fresh from a new barrel placed in a slat-sided box covered over with *at least* two thicknesses of *new unbleached muslin of the best quality*. In no instance should a thin muslin or gauze be employed, as otherwise the dust will escape within the case and cover the glass parts and thereby deteriorate the working of the machine. Some operators still successfully employ fresh c. p. sulphuric acid for its hygroscopic qualities, and others have already abandoned it and adopted the quick-lime; the lime should be changed in from one to two months according to conditions.

* * *

EIGHTEENTH ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSO- CIATION.

Arrangements have been made for the eighteenth annual meeting of the American Electro-Therapeutic Association which will be held in the Engineering Societies Buildings, 23-33 West 39th Street, between 5th and 6th Avenues, on the 22d, 23d, 24th of September. One whole floor has been engaged with ample assembly and committee rooms, and a very large exhibition hall. Arrangements are being made to make the exhibition one of the features of the meeting. It is also the express desire of the members of the Committees of Arrangements that the preparation of papers by the members of the special committees will be devoted to the special subjects assigned to them. If this is done, the meeting will afford an interest in all subjects not preceded in the history of the Association, and result, it is believed, in great advancement, now when the importance of the stand taken in physical therapeutics by the active workers is being appreciated as never before by the rank and file of the medical profession.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

The Treatment of Chronic Appendicitis with High Frequency Currents. By William Harvey King, M. D., LL. D., New York, the Chironian, March, 1908.

In the treatment of chronic appendicitis, when surgical measures for some reason as weak heart, action be deemed impossible, Dr. King has given us hopes for amelioration if not perfect cure by the high frequency modality. In his first set of cases, seven in all, only three were cured, and four failures may be laid to the use of too low frequency of interruption as with his second high frequency machine, giving nearly one million per second interruptions, he reports nine cases with six successes. Careful diet, attention to the regulation of the bowels, and light exercise all assist in recovery. The treatment is carefully carried out by comparatively lighter current 250 to 500 ma. four to eight minutes and if well borne, 800 to 1500 ma. ten to twenty-five minutes duration of treatment.

Most thorough diagnosis of the cases is most essential. The doctor rightly insists on surgical interference in all acute cases.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

The Treatment of Tuberculous Cystitis with Special Reference to Roentgen Therapy. By John M. Garratt, M. D., N. Y. Med. Jour., October, 1907.

This most interesting paper, on a most important subject, by Dr. Garratt is one of unusual interest, in a field almost entirely neglected. The doctor in the commencement of his paper devotes some space to the description of the coil and to the style of interrupter he uses and prefers. He uses a large coil of fine wire in the secondary and describes one made by himself which has given him great satisfaction.

I am glad to see that the writer lays stress upon the apparatus used, as the character of the coil has a remarkable influence upon the work done; and physicians should learn, that all coils do not give the same results any more in treatment than they do in skiagraphy.

Case 1.—A Kentucky farmer of 31 years of age, family history negative. Never had any venereal disease but was excessively fond of sexual intercourse. His trouble had lasted for six years, the most annoying symptom being frequent micturition day and night, sometimes with symptoms of obstruction and again it was more free, while at other times there would be frequent stoppages.

There was some pain in the region of the bladder and smarting on voiding urine; pain was not severe when the bladder was empty. He had never noticed the presence of blood in the urine. Five samples of twenty-four hour urine was saved for examination during his treatment. The urine was ordinarily normal as to quantity with no albumen or sugar. There was, however, a large amount of sediment consisting of pus, a few red blood corpuscles some epithelium and bacteria. Bacilli tuberculosis were present in every specimen in small numbers in small clusters, free, curved, and beaded. No kidney symptoms were present.

The seminal vesicles were enlarged and nodular on both sides, but not tender, so was the prostate. Deep pressure over the bladder and urethra showed considerable tenderness. The testicles were normal and so were the lungs and retina.

Treatment.—He was ordered to keep his rooms well ventilated and given liberal diet, was ordered salol gr. 120 and oil Gaultheria m. 240 mx. et sig. Ten drops on sugar every three hours when awake, with plenty of water, was prescribed. The bladder was irrigated every other day with a solution of boric acid and formalin through a soft catheter, and the bowels were kept loose.

Roentgen treatment was given every other day and used alternately over the pubes and the perineum. The tube distance was eight inches, using alternately medium and high tubes. Progress.—On the tenth day of treatment all discomfort had disappeared from the bladder, and he claimed that he had not felt so well in years. On the thirty-sixth day he claimed he had not felt so well in twenty years, he could go to bed at ten p. m. and hold his urine all night, no pain on voiding urine, stream larger with no stoppage. The sediment had all disappeared and there has been no recurrence now in two years.

Case 2.—Canadian farmer, aged 33, married, has seven children all healthy. The patient used alcohol and tobacco to excess. The heart and lungs were negative. He had an irritation of the urethra for eight years before (gonorrheal?). The present trouble came on five years previously after a severe exposure to inclement weather. The prostate and seminal vesicles were hard, nodular, and indurated. Epididymitis with a discharging fistula of three months duration was present. The symptom most complained of was frequent micturi-

tion and pain in the penis and bladder. Micturition was required every half hour and there was great tenesmus, which was most severe at the end of the act. There was some hemorrhage, with blood diffused throughout urine. Twenty-four hours urine was saved each week for examination, in all there were eleven analyses.

The urine was examined thoroughly. Albumen and as large amount of sediment as 0.45, 0.40, 0.425, 0.375, 0.30, 0.35, 0.25, 0.30, 0.25, 0.25 and 0.20 were present, consisting of pus, free and in large loose clumps, a little normal blood, a few vesical and prostatic epithelium and on two occasions spermatozoa; and tubercular bacilli were found in every specimen examined, except in the ninth, tenth and eleventh. Always in small numbers and in clusters, in thin rods and beaded.

The treatment of this case was identical with case 1. Roentgen treatment was given three times per week, and the scrotum was put in a bichloride pack and rayed every other day. At the commencement of treatment his bladder capacity was $\frac{3}{4}$ of an ounce. In sixteen days he slept five hours without voiding urine, and could go two hours while up during the day, and had gained six pounds. The bladder capacity was then one and a half ounces. At the end of March, or three and a half months after the beginning, he weighed 161 pounds, a gain of seventeen pounds. The bladder capacity was the same. After irrigating the bladder, it was then filled with pure oxygen. He could then make urine without pain. The three last urinary analyses showed no tubercular bacilli in the urine. One year after the x-ray treatment was discontinued his condition was normal.

Case 3.—J. W. Z., 33 years old, married, no children. Father living, mother died of phthisis. Trouble commenced five years ago and was diagnosed to be stone in the bladder, there being a sensation as of a foreign body in the bladder, and there was intense pain in the urethra and meatus, especially when up and moving about. He was relieved for a short time on lying down. He was treated from November until February. A large amount of sediment was found in the urine composed of pus, vesical epithelium, blood, and tubercular bacilli. A skiagraph showed that no stone was present. He was treated medicinally and went home improved in February, but returned April first following with all old time symptoms. The same treatment was resumed except that the x-ray was added to the treatment; and it soon relieved the symptoms and the patient as it had done in the other two cases. All bacilli disappeared from the urine.

STATIC ELECTRICITY.

EDITED BY J. H. BURCH, M. D.

In the March number of the American Journal of Dermatology Dr. William Benham Snow, of New York, has published a most valuable article entitled: "New Method of Treating Diseases of the Genito-Urinary Tract." As this communication is both concise and important the editor of this department feels that it should be inserted in toto. The physiological effects of the modalities employed by Dr. Snow as well as the technique employed in the treatment of maladies of the genital tract, are very carefully considered and the treatment is not only suitable for these affections, but is almost universal in its application in pathological conditions depending upon local stasis and infection.—J. H. B.

New Methods of Treating Diseases of the Genito-Urinary Tract.
By William Benham Snow, M. D., New York City.

For more than seven years the writer has had a series of successes in the treatment of diseases of the genito-urinary tract by methods discovered by him during the treatment of other conditions; and is now in a position to state the facts evolved without a possibility of contradiction.

It is generally true that those who are unfamiliar with the progress of physical therapeutics are incredulous of the truth of statements made by those who do know how to employ them. As a matter of fact the principles involved in the employment of these agents are as positive as surgery, and fully as successful in the hands of those who understand them.

Two principles are involved in the treatment of inflammatory conditions in affections of the genito-urinary tract as in congestion elsewhere. (1) The removal of infiltration and induration for the purpose of permitting the re-establishment of circulation and local metabolism in non-infectious cases and (2) the destruction of the element or elements of infection and subsequent employment of the first principles in infectious inflammation.

The *modus operandi* involved in the accomplishment of the first principle is most simple when the indication and action

Fig. 1.—Connections for Static Wave Current.
(See page 234, Fig. 8, of this Journal.)

of the means that will accomplish the desired effect are fully recognized, and the same is true of the second class of conditions. A knowledge of the pathology of the condition, the

normal physiological action and histological condition of the part, and a method of restoring normal metabolism and function, when organic change does not render it impossible, are the elements naturally essential to successful treatment.

Simple inflammation is evidenced by the presence of congestion with swelling, tenderness and heat, varying with the acuteness of the process, under conditions which preclude the possibility of prompt repair, constituting a defeat, or inadequate ability of the *vis medicatrix naturæ*, finally resulting in what, in common parlance, is known as chronic disease. A persistence of such process anywhere without intervention and restoration to normal, results in the development of hyperplastic or scar tissue.

The indication under the above conditions is restitution by some means that will remove the infiltration and restore local metabolism and circulation, making possible the institution of repair.

A means to meet these conditions must be possessed of properties which will accomplish the expression or elimination first of the infiltration, and by softening the tissue permit the restoration of circulation throughout the involved region. An agent to accomplish this result must do so without irritating the tissue, or otherwise a relapse is certain to follow. Such an agent must act upon the structures or parts not grossly, but diffusely affecting the protoplasm of the affected mass to the remotest part of the involvement. The action, therefore, must be diffuse and general and coincidentally induce activity in the normal cell structures of the region. To accomplish this purpose, for obvious reasons, massage, low volt electrical currents, as the induced and continuous current, and the high frequency current, which produces no contraction, and drugs are essentially impotent; while surgery dismembers or removes a portion of the normal tissue elements thus affected.

The only known agent capable of affecting the sort of action on non-infected inflammatory areas, with thoroughness and without danger to the parts involved, are the *static* currents



Fig. 2.—Straight Metallic Rectal Electrode, without Handle.

of high potential and low amperage, because they are *capable of the greatest degree of diffusion and induce most marked tissue contraction* in the involved tissues. This truth has been demonstrated by the writer in thousands of cases and verified also by hundreds of other skilled observers.

The static wave and static induced current or the static current administered in the same manner with a glass vacuum tube instead of metal electrodes, are the modalities, or methods

of application, which best conserve the purpose, particularly in the class of conditions under consideration in this paper. For the treatment of pelvic conditions with the exception, only, of those cases of infectious character, a static machine having eight revolving plates meets the indication, and not the high speed machines with less revolving plates. Furthermore, in all cases in which a machine having 16 revolving plates is employed, the wave current, for the mechanical effect above described, for treatment of inflammatory conditions in these parts, rarely if ever should be used without the employment of some means of controlling or lessening the volume or intensity of the discharges. The same rule does not apply to the use of vacuum electrodes.

Those who are not familiar with the administration of the static current, can ill appreciate the *modus operandi* of the modalities referred to without some further explanation.

There are five elements which constitute the factors of importance in the consideration, varying the character of the current employed, embracing the method of making the applications, and controlling the output of the static machine: (1) polarity, (2) length of spark-gap, (3) speed of the machine, (4) character of the grounding, and (5) the duration of the administration.

The polarity of the current employed, administered to the patient placed upon the insulated platform, should be in all cases from the positive side of the machine, except in cases of infectious inflammation, when the vacuum tube connected from the negative side, produces a larger degree of actinic and antiseptic action, and is therefore indicated, if either.

The spark-gap passing between the balls of the pole pieces of the machine, is the measure of the potential or voltage exerted upon the tissues; the capacity of penetration increasing with the length of the spark-gap, which should not be permitted in these cases to discharge more rapidly than from 300 to 400 per minute, which is best determined by the *ear measurement* or recognition by the ear of a distinct interval between the sounds produced by the successive discharges. The reason for this observation is based upon the fact that tissue responses are incapable of appreciation above 600 per minute and that intervals of recoil are essential to most complete drainage of the tissues by the mechanical action of the current. Each impulse produces a contraction of the tissues to a depth relative to the length of the spark-gap, and the interval before the next discharge should permit a period of rest or recoil between the discharges.

The speed of revolution should be under control by a rheostat provided with a large number of steps when the continuous current is employed, or a mechanical speed controller or adapter in connection with a rheostat when the alternating cur-

rent is employed. The speed of the machine is the means of regulating the rate of discharge at the spark-gap, the speed to be diminished as the gap is shortened, or *vice versa*.

Grounding. The side of the machine not connected to the patient should be connected directly to some metallic connection with damp earth, as the house water or gas pipe. The intensity and ability of the current to induce contraction is greatly accentuated by such connection, when either the wave current is employed or the vacuum tube current referred to.

The proper average duration of the administration which after years of investigation has been found to produce the best results when the wave current is employed, is twenty minutes. With the vacuum tube the applications are usually made for from ten to fifteen minutes within the cavities, but do not possess to anything like the degree of energy, other things being equal of the mechanical effect of the current when used with metallic electrodes.

The accompanying drawing (Fig. 1) illustrates the method of making the connections with the static machine, which are identical with the two methods referred to, except when in infectious conditions as above described, with the employment of the vacuum tube, the patient is connected to the negative side of the machine, and the positive is grounded.

These currents and the static sparks are the most energetic known means of resolving the infiltration or induration of local stasis—a condition absolutely impossible of relief in most cases from Nature's own resources. The action is a mechanical one but of such a character as cannot be produced by any other agent than the electrical current, or a current from any other source with the same efficiency and safety as from the static machine. If an electrode is placed in contact with the tissues of an organ, it is not necessary that it should envelop or cover the whole structure of a gland or other organic structures, to induce contraction whereby the organ is actively affected as of either the prostate gland or the muscular structure of the uterus, and it is capable of throwing the tissues into successive contraction and rest, when administered as above described, the protoplasm of muscular, yellow elastic and epithelial tissue, and will penetrate to the remotest part of the structure to which it is applied when the spark-gap employed is of the requisite length.

In the treatment of infectious diseases of the genito-urinary tract, the agents which are energetic in the writer's hands in removing or destroying germs are the high frequency current, the direct vacuum tube current above described, the x-ray, and the high power incandescent lamp or focused rays from lamps of lower power.

The energy of the high frequency current in the treatment of these conditions depends upon the large amperage of the

current, as derived from static machines having 16 to 20 revolving plates of the usual diameter, or the x-ray coil, either of which produce a current capable of inducing pronounced local antiseptic or actinic effects, which are due (1) to the ozone and nitrous acid evolved at the site of contact of the electrode with the tissues—products of electrical decomposi-

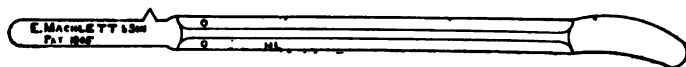


Fig. 3.—Titus Prostatic Electrode, without Handle.

tion—and (2) the phoretic action of the current whereby these and other medicinal substances when employed are conveyed into the tissues, and (3) the effect of the current in inducing local hyperemia; thereby bringing into the tissues involved, an increased quantity of fresh arterial blood, with a relative increase of local phagocytosis, and (4) the electrical action of relatively large ampere currents which may have some action in bringing about the pronounced effects associated with the relief of localized infection.

The application of these currents is always made locally through the medium of vacuum electrodes which are made of shapes adapted to different regions in such a manner that the current may be localized, the stem or handle of the electrode being in some cases insulated except at the terminal end. When administered from the coil or static machine, the current should be applied from the d'Arsonval terminals of a high frequency device attached to the two poles of either apparatus. The vacuum tube should then be placed as near as possible to the site of the involved tissue, and connected to one side of the d'Arsonval attachment, and a metal electrode connected to the other side, placed upon the bared skin of the abdomen, directly opposite the region of infection, and 200 to 300 milliamperes of current be allowed to pass as indicated by the hot wire meter in the circuit. By this method the greatest density of current is transmitted immediately through the involved tissue.

The Roentgen ray has a most remarkable effect in removing from the tissues the infection of the pyogenic bacteria as was first demonstrated in the treatment of pustular acne, by the writer and others, the abortion of larger abscess processes, and more recently, in the writer's experience, in the cure of cystitis. Whether this action, singly or in combination, is due to its (1) inhibitory effect by sterilizing the germs and thereby stopping propagation, or (2) by placing the germs at a disadvantage enable the phagocytes to destroy them, or (3) by a direct destructive action upon the germs themselves—the least probable of the reasons—is not positively demonstrated; but that they do, when applied with the proper degree of energy,

stop the progress of development, and in the early stages eliminate all pus processes, is a well established fact. For this purpose the rays should be applied with all the energy that the normal tissues will stand. The writer's custom is to begin with one 20 to 25 minute exposure, employing an x-ray tube having a vacuum relative to the penetration demanded by the depth of the process or resistance of the intervening tissues, and not repeating the exposures for two days, after which raying on alternate days for ten minutes, employing all of the energy of a static machine having 12 to 16 revolving plates for 10 minutes, run at a rapid rate of speed, or making exposures of 7 minutes each with the x-ray from a coil, employing a degree of energy producing a fluorescence upon the glass of the x-ray tube about equivalent to that produced by a 16 plate machine, running at 300 to 400 revolutions per minute. In the early stage of pus processes there is a prompt inhibitory effect from the first exposure with a gradual disappearance of the process. It is the writer's custom now to employ light alternating with the x-ray, allowing 24 hours to intervene between the exposures and the application of light. The writer's theory of this plan of operation is based upon increasing the number of the phagocytes in the region of the infection by the energy of radiant light and heat, because of the production of pronounced local hyperemia after the inhibitory action of the ray, favoring destruction of the germs. The counter action of the light also wards off the danger of an incidental superficial x-ray dermatitis.

Radiant light and heat from the incandescent lamp as applied to the treatment of infectious conditions, derives its potency from successfully influencing the destruction of bacteria from the combined influence of the radiations of light and heat, whereby (1) the induration is softened, (2) the local hyperemia greatly increased, with increased numbers of phagocytes in the region, with the constant passage of fresh arterial blood through the field of infection, and (3) the undoubted coincidental inhibitory action of the light and heat radiations upon the pyogenic bacteria. The applications should be made, over localized areas, with the small 50 candle power lamp with parabolic reflector, employing as great a degree of intensity as can be tolerated, and over large surfaces with 500 candle power lamps. The effects upon the early stage of infectious inflammation, of these applications in superficial cases, is most remarkable, in many cases aborting them. They are remarkably effective in the treatment of buboes, furuncles and other accessible infections.

It has been well established that in the treatment of infectious conditions, these physical agents are not wanting in potency; and their indication in the treatment of gonorrheal infection as well as in the infections by pyogenic bacteria, are more certain

in their action than internal medication or local antiseptic injections.

From the foregoing principles of action and the indications, for the employment of physical agents in the treatment of local inflammatory processes, infectious or non-infectious, a wide field must, in the future, be accorded these measures not alone in diseases of the genito-urinary tract, but in all similar conditions elsewhere.

It was the writer's good fortune to have discovered the efficiency of the static wave current in its influence upon local and general metabolism, and to first set forth in his works upon the static currents, the *modus operandi* of these currents, as influencing local induration and infiltration—local stasis.

Prostatitis. While treating a case of neuritis, intra-pelvic, through the rectum, it was observed that there was a prostatic enlargement present which at the first administration was diminished fully one-third in size, and softened throughout the whole substance of the gland. This effect suggested its application in that condition. The success of the treatment was soon demonstrated in the writer's first case which was given systematic treatment by the wave current.

The patient, a man 63 years of age, was suffering from the most extreme and aggravated symptoms of prostatic hypertrophy, and was absolutely relieved of the annoyance and inconvenience by the first three applications of the static wave current, employing a long straight metal electrode (Fig. 2) held by the hand against the hypertrophied prostate for twenty minutes daily, and then every other day, with the complete cure of the condition within three weeks from the commencement of the treatment. It is now about seven years since this patient came under observation and there has been no relapse or recurrence of the condition since that time. He has been frequently seen, and is now under treatment by the writer for high arterial tension associated with arterio-sclerosis. This method of treatment is absolutely free from danger, and has proven efficient in the writer's hands in fifty cases, and very rarely (three cases) has any relapse occurred and *they* were promptly restored. Among those treated have been many patients who had been subjected to thorough stripping and massage in the hands of some of the ablest genito-urinary workers. One notable case, that of a young physician, who had been stripped for six weeks without benefit and with a loss of seven pounds in weight, was absolutely cured and had regained his weight within fifteen days.

To those unfamiliar with the method these statements may seem unwarranted; but are true nevertheless, and will be verified by the genito-urinary workers who are fortunate enough to employ it. In all conditions of infiltration and hypertrophy without the presence of pus, neoplasm, malignancy or a large

degree of hyperplasia, the results are uniformly successful with relief of the condition in all cases whether the cause be infectious, traumatic or otherwise; as they have been uniformly in the hands of a general practitioner.

In seminal vesiculitis, either of the infectious or non-infectious variety, very satisfactory results are obtained from the employment of the insulated electrode shown in Fig. 3, which was designed by Dr. Edward C. Titus. This electrode is placed in contact with the vesicle through the rectal route and the current taken from the negative side of the static machine with the positive side grounded as previously described. By this means it is not only possible to remove the contents of the vesicles by the contraction induced in the parts, but there is absolutely no doubt in the minds of scientific observers, that the germs present are destroyed by the action of the current. It has been suggested and demonstrated by Dr. Eugene Fuller of this city, that the vesicles are the residing place of the gonococci, and that when removed by the surgical method employed by him, *gonorrheal rheumatism* wherever present, disappears. This fact has been verified by Dr. Edward C. Titus of this city, and Dr. Robert A. Black, The Homestead, Hot Springs, Va., who have reported the cure of gonorrheal rheumatism by the treatment of the vesicles by the vacuum tube as described. It is also a well established fact by the writer and numerous other observers that all shreds and other evidences of infection disappear from patients treated by this method. It is desirable in some cases to employ an electrode having a longer surface for contact, that will thereby include the spermatic tubes and prostate as well as the vesicles during the application. For this purpose, if a 16-plate static machine is used, the volume of the current employed through the ordinary straight metal electrodes is capable of effecting the destruction of the lurking germs throughout these bodies, and thereby effectually remove the infection in that portion of the genito-urinary tract. The recognition and verification of the efficiency of this method by the genito-urinary specialists and others who employ the method will prove one of the greatest boons to humanity; and now when an efficient means of eradicating this lurking evil has been discovered, may lead up to the institution of legalized prophylactic requirement before matrimony in at least all males who have been victims of gonorrheal infection.

Orchitis. In cases of traumatic or infectious orchitis, except in cases of abscess, malignant, or tubercular process, the relief is prompt by the same principles of treatment as outlined above. A glass vacuum electrode, having the face bounded by a circle two inches in diameter, preferably with a concave surface, and provided with an insulated handle, to be held in the hands of the patient, is held first against the upper

end of the gland for five or ten minutes and as the tissues soften, is moved downward over the whole involved structure, until the tissues are thoroughly softened, which may require one-half hour, or even longer, when the parts which were too tender to be manipulated may be easily palpated without causing suffering. The application repeated on three or more occasions on succeeding days, according to the severity of the conditions, will effectually relieve the inflammation and swelling, and promptly restore circulation and a return to normal in the shortest possible time, and at once make the condition entirely comfortable for the patient.

In epididymitis, exactly the same method obtains, the electrode to be applied over the region of involvement. This method of application is contraindicated, as in prostatitis and every other condition where tuberculosis, a malignant process, or a developed abscess is present, in which case the x-ray should be applied as previously described, and followed except in malignant cases, by the energetic use of light, with a view to eradicating the elements of infection; and will prove efficacious in a fair percentage of cases.

Impotency, arising from the preceding conditions, or from excess, or physical or nervous conditions, is usually coincidentally relieved with the cure of the local conditions; and by the institution of local and general metabolism with restored nutrition, the wave current or vacuum tube current above described are the most effective local means of application, in all cases.

In buboes, or furuncles, located in these regions, the x-ray and light as above described, is the most efficacious means at hand and if instituted early enough in the cases, and employed with proper energy, will effectively abort the condition, and serve to hasten recovery, when employed after the abscess has been opened, lessening the danger of a continuance of the furuncular or septic process elsewhere.

These methods of treatment are as applicable in the treatment of other conditions in the pelvic region, including uterine malposition due to a congested state of the organ, or dysmenorrhea, arising from the same cause, urethral caruncles, vaginitis, and salpingitis, and a number of successful results have been reported also from reliable sources, of the employment of the d'Arsonval current, as described above, in the treatment of pyosalpinx.

It will be readily seen that the *modus operandi* in the treatment of these cases, is entirely rational from the point of view of the intelligent and scientific employment of the measures described in this paper, and the results obtained by a large number of scientific observers, verifying the statements herein contained, not only warrant, but would seem to demand their investigation by those who are devoting their time and attention to the treatment of these maladies.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

The Spa Treatment of Circulatory Disorders.

Since the introduction of the Nauheim treatment for heart disease, there has been a tendency to recommend this resort and its methods rather promiscuously. L. Williams in the *Lancet*, August 5, 1905, insists that this line of treatment has only a limited field of application, and that other health resorts may also be beneficial in circulatory diseases. The principal effect of the Nauheim treatment is to increase the blood-pressure and thus stimulate the heart. The cases that are best suited to such treatment are those of dilation and weakness of the heart without valvular disease, such as occurs after influenza or typhoid. Many functional and neurotic conditions of the heart also respond to this treatment. In valvular disease, with or without compensation, the Nauheim treatment only increases the peripheral resistance to an already overacting heart, and may do great injury. The object of treatment in such cases should be to lessen the work of that organ. This may be done by careful regulation of diet and exercise, and by promoting adequate excretion. It is possible to do this at home, but there is the danger that the patient will not adhere strictly to his instructions. It is in such cases that a sojourn at some health resort, under the supervision of a competent physician, is of the greatest value. Patients with broken compensation, however, are best treated at home. Many so-called functional disorders of the heart depend upon increased vascular resistance, and it is especially these cases that are amenable to the regulating treatment of a health resort. The particular resort is not of much consequence, but in a general way it may be said that any spa at which gout is treated, is suitable. (The Nauheim treatment, like all else in therapeutics, must be "mixed with brains." It tends to diminish, and not, as Williams states, to increase peripheral resistance. It is very useful in mitral diseases, especially stenosis, provided there is still a sufficient quantity of good, muscular fiber to respond and that there is not a high degree of arteriosclerosis.)

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

Animal Therapy: Its Relation to Immunity in the Treatment of Tuberculosis. Journal.

In a forty-page monograph he gives a description of his treatment with his "anti-tubercular lymph" and the results he

has obtained, while working with Von Behring, he found that it was possible to render young cattle immune to tuberculosis by inoculating them with a sterile emulsion of tubercle bacilli, and further that cattle inoculated with lymph from these animals already immunized, were likewise rendered immune.

Applying this treatment to tuberculous patients, he reports good results in a large number of pulmonary cases. Even advanced cases seem to be markedly benefited if their resistance is not too low. Even in fatal cases many of the distressing symptoms—pleuritic pains, night sweats, and excessive expectoration—are decidedly controlled. This dose is ten to twenty minims daily, injected into the subscapular region. No untoward reaction is produced—by its administration.

Treatment of Epidemic Cerebrospinal Fever by Intraspinal Injections of Flexner and Jobling's Antimenigitis Serum.

A. G. Robb in the British Medical Journal of February 15, 1908, gives his results with the serum treatment in the epidemic at Belfast. Of 275 patients admitted before the treatment was begun, 72 per cent. died. After the use of the treatment was begun, 32 cases in all were admitted. Of these 68 per cent. recovered. The dosage and technic of administration are given in detail.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Treatment of Acne Vulgaris.

Dr. Sutton of Kansas City, Mo., read a paper before the Clay County Medical Society on the above subject in which he goes thoroughly into the histology, symptomatology, diagnosis and treatment. Although acne is so common a disease and affects young adults mostly—a class of patients who are extremely sensitive to any facial blemish—any advancement in treatment is gratefully received by them through their family physician. (Editor.) In speaking of the treatment, Dr. Sutton claims there are few skin diseases in which it is important to employ both systemic and local treatment if permanent results are to be obtained. He thinks that each case must be carefully studied and all possible etiological factors considered. What seems to be a miraculous cure will sometimes result from the correction of some simple dietetic error.

“Exercise, especially in the open air, cold baths, and a brisk rub, a simple nutritional diet, with the interdiction of alcohol

and other stimulants are all of importance." The author condemns all greasy and fried foods of all kinds, gravies, cheese, pastries, hot breads, sweets (especially candy), pickles, ice water, tea, coffee and cocoa, also starchy foods as a rule. In young girls or in those cases in which the utero-ovarian system is not performing its function properly, he advised the administration of small doses of ovarian extract (two grains in capsules) twice daily, for a week, and then skip a week.

The vaccine treatment of Wright is believed to have a brilliant future in this disease but the question of dosage is so variable because of the instability of the opsonic index which is used as a gauge, and the determination of the latter so complicated, and subject to error, that much work remains to be done before the method can be adopted by the general practitioner.

The author advises that the comedones should be expressed every day with Piffards' instrument, and that a lotion of zinc and sulphur should be used. In the deeply indurated forms when the face is studded with small abscesses they should be opened with a narrow pointed bistoury, contents squeezed out, and the cavity mopped with a tiny cotton swab dipped in pure carbolic acid.

He speaks of the x-rays as giving brilliant results at times. He prefers a soft tube placed 30 to 50 centimeters from the affected area, making the exposures very brief (two to five minutes) at first, two or three treatments weekly.

The author has used for several months a high power incandescent lamp in addition to the usual remedies. He attaches much importance to the therapeutic action of this lamp and the method of using it.

The light is passed through a colored screen before reaching the patient. In the sluggish types when marked stimulation is indicated, the white, red, or yellow is used. In the acute or subacute inflammations, or when a soothing effect is desired, the blue, violet or green is employed. He finds the plan most excellent both as regards cosmetic effects and the rapidity of cure, and is especially valuable in those cases in which scarring has occurred.

The author advised the use of the very high candle power lamp; although the smaller lamps equipped with colored globes may be used with more or less success (with either single or multiple bulbs) yet the therapeutic effect is obtainable only by the method as used by the author.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

CHAPTER III.

RADIANT LIGHT AND HEAT.

(Continued from p. 223.)

The *hyperemia* induced by the action of these frequencies which is associated with tanning, is very superficial but painful in its effects, in many cases inducing vesication of the skin, and therefore except when such effects are desirable, are contra-indicated. It would seem that the main object in nature, as far as the human race is concerned, of the ultra-violet and higher visible frequencies, is to effect tanning in order that white races living in the tropics or during the summer seasons in temperate zones, who are much exposed to the sunlight, may not be overstimulated by the penetrating action of the stimulating rays of light and heat of the lower frequencies. It is an undoubted fact that in the course of centuries, peoples who live constantly in these climates have become dark-skinned races, as is notable in the Spaniards, Italians, and others living in the tropics or southern portion of the north temperate zone.

The induction of hyperemia by the actinic effects of the higher frequencies, and from the combined action of all the frequencies of light together with the radiant heat, are demonstrated to be capable of increasing positive chemiotaxis, hastening the destruction and release of the tissues from deleterious substances, or forms of germ life present in them. The degrees to which this may be effected will vary with the character of the radiations as to volume and intensity.

The effect of light and heat radiations upon metabolism is to quicken the functional activities of the cells thus stimulated, promoting elimination through secretion of the sweat glands, and inducing an increased influx of blood associated with the hyperemia produced, thereby favoring local nutrition and

elimination. The application of intense heat and light to the peripheral neurons undoubtedly also stimulates reflexly greater activities in parts and organs remote from the site of stimulation. This is clinically demonstrated in the beneficial influence of light upon tissue building, and increased body weight, probably by influences both anabolic and katabolic. These effects, in a general way, indicate the therapeutic employment of light, and place it in the field as one of the valuable physical therapeutic measures.

CHAPTER IV.

SOURCES OF RADIANT ENERGY.

The sources of radiant energy are both natural and artificial.

The natural sources are the sun, radium, uranium and other radio-active bodies; the sun alone in connection with this chapter calling for consideration.

The artificial sources are the electric arc, incandescent, and mercury vapor lamps, and the Crookes tube, all electrical sources; and others not practical for therapeutic purposes, including all flaming or burning materials, which emit radiant light and heat.

I. *The sun*, the natural source of light, furnishes all that could be desired when employed in conjunction with surrounding conditions and the necessary means for facilitating condensation, direct radiation, and in connection with various arrangements for filtration when desirable.

The variations in weather conditions in most climates, however, render it as a source of radiant energy rather too capricious for a practical means in therapeutics.

II. *The electrical arc*, as an artificial source of radiant energy, has been employed since the first introduction of artificial light in therapeutics. It possesses the advantage, especially when generated in connection with iron cored electrodes, of evolving rays particularly rich in the chemical or ultra-violet end of the spectrum. There are disadvantages in the administration however, when it is to be employed for the general or constitutional effects in that it cannot be applied directly over a patient, as when resting in a recumbent position, because of hot flying particles from the consuming carbon electrodes. Another dis-

advantage is that the relative amount of current consumed in the production of a given amount of radiant light and heat is much greater than with the high power incandescent lamp. In the enclosed light bath employing sufficient candle power to produce the desired radiant light and heat effects, it is impossible for some patients, and all patients under extreme conditions of time and intensity, to inhale and withstand the gases thrown off from the arc lamps. These gases are composed largely of nitrous acid and ozone, evolved by the electric arc. Furthermore, when it is desired to produce profound, combined light and heat effects, for a long period of time, the ultra-violet rays, as stated in the previous chapter, induce too great a degree of hyperemia of the skin, which is followed by marked tanning, due to the peculiar action of the higher frequencies. However, in certain cases, the induction of intense hyperemia may be desirable, but the tanning interferes largely with subsequent beneficial effects when it is desirable to continue administrations of radiant energy to the deeper tissues. For the treatment of local infectious processes, as in lupus vulgaris, with the employment of intense focused light, rich in ultra-violet, the arc light is indicated in some cases.

III. The incandescent light properly fills the widest field of therapeutic indication. This type of lamp combines a large percentage of radiant heat and from focused rays, and lamps of high candle power are rich in luminous rays—rays which penetrate deeper into the tissues than the radiations of the higher frequencies in which they are deficient. A light of this sort is always most convenient of application, as it can be applied directly over the patient while reclining; with the advantage that a maximum surface is receiving the radiations while the opposite surface is not exposed during the administration. Another advantage is that the light may be moved back and forth over the surface with the greatest convenience and by the patient himself during applications to the front of the body. Another advantage of the incandescent light is that it is depleted of the ultra-violet radiations and may therefore be applied, if desirable, for a longer time without danger of producing a disagreeable hyperemia or eventually tanning the surface of the skin, thereby interfering with the maximum degree of therapeutic efficiency.

IV. The mercury vapor lamps have been employed by some

for general applications but to the present time have little recognized therapeutic value. The radiations produced by these lamps are rich in the higher frequencies, but the red and infra-red are absent; and as the ultra-violet frequencies are filtered out, by the glass, as they would be, possess no advantage over the incandescent lamps, but a decided disadvantage in that the red and heat rays, which are most penetrating and effective, are to a very large degree absent from this type of light.

APPARATUS.

There have been several types of arc lamp manufactured and used for therapeutic purposes.

The marine search light, manufactured by Bogue & Co., of New York, is provided with a parabolic reflector and movable carriage, and self-adjusting device for maintaining the carbon



Fig. 6.—Marine Search Light.

electrodes in contact (see Fig. 6). The movable or adjustable platform may be so regulated as to vary the divergence or convergence of the rays whereby either parallel rays or focused rays may be projected upon the patient. The author's appa-

tus has also been provided by him with a hood and water cooling device, whereby the rays from the arc may be focused and emitted through plain rock crystal lenses for use for the treatment of one patient instead of four as by the arrangement of Niels Finsen to be employed for the treatment of lupus or other conditions in which this method of treatment may be indicated. A blue glass screen is also provided with this lamp.

The *actinolite*, one of the older types of arc lights, focuses or renders the rays focused or parallel by passing them through a movable glass lens. This lamp was manufactured by Kliegl Bros., also of New York, and is of varying capacity. It possesses the same disadvantages as the other arc lamps except that the light being passed through glass lenses the ultra-violet radiations are cut out or absorbed.

Another arc recently put upon the market by Frank S. Betz, of Chicago, (Fig. 7) is practically after the same idea as the

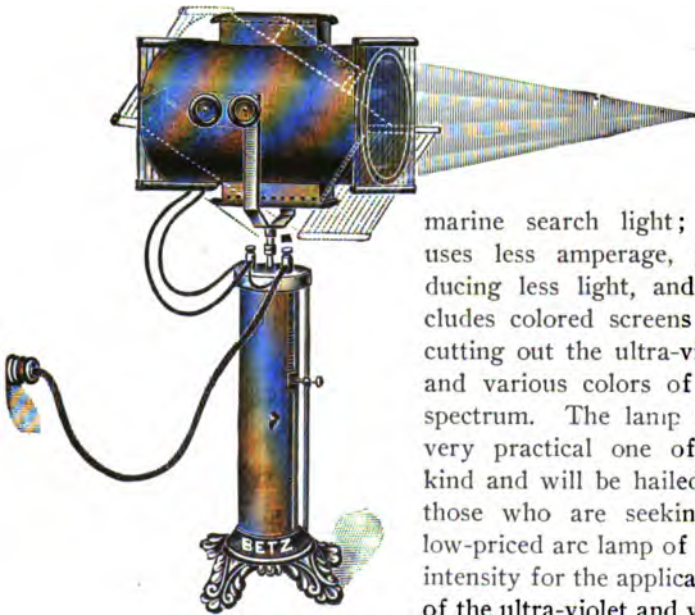


Fig. 7.

marine search light; but uses less amperage, producing less light, and includes colored screens for cutting out the ultra-violet and various colors of the spectrum. The lamp is a very practical one of its kind and will be hailed by those who are seeking a low-priced arc lamp of fair intensity for the application of the ultra-violet and various other radiations at the discretion of the operator.

The *solar arc lamp* is of cheaper and simpler construction and provided with an adjustable arc and parabolic reflector, but employing less amperage and consequently producing less



Fig 8.—London Hospital Lamp.

radiations. It must be observed in connection with this lamp and other arc lamps provided with parabolic reflectors, that as the arc is drawn from the reflecting surface, as at the focal point the radiations cross, a shimmer of what the uninitiated are sometimes led to believe are violet radiations appear within the center of the light ring. As a matter of fact, this is the dark field beyond the point where the focused rays cross. (See Fig. 5). The same is true beyond the focal point of the incandescent lamp, provided with a parabolic reflector.

The elaborate apparatus of Neils Finsen consisted of a 90-ampere arc placed in the center, the radiations being projected through four tubes, and condensed through rock crystal lenses and the heat rays filtered out through ice or cooled water placed in the tube. Four patients placed at the four angles were treated at one time with the involved surfaces pressed against the outer lens of rock crystal, to render the tissues anemic, a necessity demonstrated by the experiments of Finsen. This apparatus has been but little used in this country, though several of the apparatus have been installed, because the ultra-violet rays are indicated in such a limited number of cases; particularly the types of lupus which are very rare in this country; and because, immediately following the introduction of the methods of Finsen, it was demonstrated that the x-ray was more effective in the treatment of these conditions. A much less expensive and equally practical apparatus is the London Hospital lamp first designed by Lartet and Genoud, many modifications of which have been produced, notably the one shown in the accompanying cut (Fig. 8) manufactured by the Victor Electric Co., of Chicago, New York and Boston. This type of lamp largely supplanted the more elaborate lamp of Finsen. It will prove of value in a limited number of cases which may not respond properly to the Roentgen ray, or in which the x-ray would sacrifice the part, as the lobe of an ear involved in a lupus process.

The electric incandescent lamps.—A large number of therapeutic lamps of the incandescent type have been put upon the market, all of which possess certain degrees of merit. A lamp of small candle power is valuable for applications to circumscribed areas, even for intense local treatment, but for their effects upon general metabolism and other purposes of administration too large areas are not practical, as they consume too

much of the time both of the patient and physician. Of the high candle power incandescent lamps, the most practical type is the so called Leucodescent light manufactured by Spear-Marshall & Co., of Chicago, (Fig. 9). One feature of this particular lamp is the character of the reflection, which instead of being by a parabolic reflector with one focal point, is constructed with a corrugated reflector and conical side reflectors which project lines in parallel and crossing lines of radiation having two parallel fields of greatest brilliancy and intensity, which permit the operator to move the lamp about in such

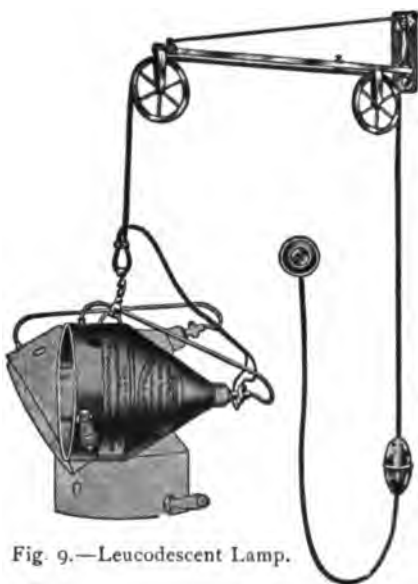


Fig. 9.—Leucodescent Lamp.

a manner that these two fairly large fields of intense radiation can be tolerated, as they cannot be when held in one position directly over the regions of tenderness or inflammatory involvements. At the same time the whole surface receives a liberal radiation of light and heat. In the writer's experience this type of lamp meets most acceptably the demands of the localizing incandescent lamp for general therapeutic administration.

The Minin light, devised first by Professor Minin of St. Petersburg, consists of a 50 to 100 c. p. incandescent lamp with a bulb of "natural-blue" glass, and provided with a reflector for projecting the radiations. While various claims have been made as to the anesthetic effects of this lamp, in the writer's experience the only advantage he has discerned, if it be an advantage, is the additional heat radiation from the conversion of the luminous and other frequencies absorbed by the glass into heat radiation. In other words, the Minin lamp becomes a radiator of heat, but in this respect does not seem to have any advantage over a high candle power lamp which may be raised and lowered over the surface of the patient, and the tempera-

ture regulated to the point of toleration without cutting out the generally beneficial light radiations. This statement is made from the author's observations, in view of the fact that Professor Minin and others have reported favorably of blue light.

The manufacturers of the *Leucodescent lamp*, Spear-Marshall & Co. have manufactured screens (Fig. 10) constructed of narrow strips of colored glass in three colors—blue, orange and red—by means of which when fastened to the



Fig. 10.



Fig. 11.

lower rim of the shield permit that only those rays may be administered in combination with the heat rays; and a small hand lamp, (Fig. 11) the "midget" lamp provided with 50 candle power bulbs of white and the other colors as provided for the screens for use with the large lamps.

SOCIETY MEETINGS.

INTERNATIONAL MEDICAL SOCIETY FOR AID OF THE SUPPRESSION OF WAR.*

Voted upon by the Association 25 Rue Mathurins, Dr. J. A. Rivière, presiding.

(1) That it shall be desirable that all members of our Association make every endeavor to draw the attention of the general public (or people at large) by means of forceful lectures which, assisted by suggestive representation of battles by

* Resolutions and Suggestions, Adopted in Paris, France, March 21, 1908.

stereopticon views, should eliminate forever all scenes of violence and criminality.

(2) That under the seal of our Association an active propaganda be organized for the diffusion of humanitarian and wholesome sentiments, thus lessening all antagonism and criminality.

(3) That the Czar, in defense of peace, should have taken in consideration as exceptional, the offence of General Stoessel who, in forestalling by a few days his surrender, performed an act of the greatest humanity.

(4) That our Society should consider the laws regulating the Morocco question as a means towards International pacification and bear in mind that it has been submitted to an International Tribunal who decided upon the creation of an international policy.

(5) That congratulations be tendered Sir Edward Gray for the happy initiative in joining with the French government in the nominations by the Powers of a Governor General, empowered to settle the result in Macedonia.

(6) That congratulations be tendered China for having spontaneously proposed that her differences with Japan be settled by an International Tribunal.

(7) To establish clearly the understanding between the two countries, England and France, giving them jurisdiction over the narrow straits of the near Hebrides as a real manifestation of good faith and inspired by honest motives.

(8) Congratulate those in America who have resolved to appeal to arbitration in all future disagreements.

MEETING OF THE NEW ENGLAND AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION, HELD MARCH 18, 1908.

At this meeting the JOURNAL OF ADVANCED THERAPEUTICS was made the official organ of the Association, and a paper was read by Dr. Frank B. Granger of Boston on "The Electrical Treatment of Certain Functional Neuroses."

At the April meeting papers were read on "The Treatment by Electricity of Uterine Fibroids and Allied Conditions," by Dr. Fred H. Morse of Melrose, and "Neurasthenia and Its Treatment by Electricity," by Walter H. White, M. D., of Boston.

At the May meeting a paper will be read on the "Hyperemia Treatment of Chronic Affections," by E. H. Bradford, M. D., Boston.

SAMUEL J. HARRIS, M. D., *Secretary.*

The Journal of Advanced Therapeutics

VOL. XXVI.

JUNE, 1908.

No. 6.

DIFFERENTIAL DIAGNOSIS BY MEANS OF THE ROENTGEN RAY OF DISEASES OF THE OS- SEOUS SYSTEM.*

BY WILLIAM H. DIEFFENBACH, M.D., NEW YORK.

Among the recent advances of Roentgenology, the differential diagnosis of diseases of bones deserves attention, owing to the great advantage in therapeutics and surgery accruing from an exact knowledge of the pathological state in each suspected case.

Heretofore the anamnesis, exterior appearance and palpation, and frequently the intuition of the physician has been depended upon for diagnosis in this class of lesions. The profession at large is aware of the advantage of Roentgenology in the diagnosis of fractures and dislocations of bones, but until the recent works of Rumpel,† and of Hahn & Deyche-Pascha,‡ no extensive Roentgen-ray literature existed relative to diseases of the bones *per se* and no clear-cut differential diagnosis was available in these cases, so that interpretation of Roentgenograms was difficult and not precise.

The writer has collected a number of plates of various bone-lesions and, aided by a study of the above mentioned works, offers the following differential diagnosis for further study and criticism:

I. Periostitis.—The periosteum is so intimately connected with bone that both tissues are often affected when disease invades their sphere.

Simple periostitis is difficult to diagnose until the inflammatory process has produced some swelling and deposits of some size are noted. This requires at least two weeks, when circumscribed areas of darkness and thickening of the periosteum appear. If suppuration takes place, the bulging of

* Read before the Academy of Pathological Science, New York, April 24, 1908.

† Published by Lucas, Graefe & Sillem, Hamburg, 1908.

the periosteum is clearly made out in the Roentgengram and the dark shadow of the purulent exudate will appear. Felons can thus be readily diagnosed with the ray. Traumatic periostitis is common especially at the anterior tibial and posterior



Fig. I.—Periostitis.

ulnar regions and leads to thickening of the periosteum, which throws a dark shadow upon the Roentgengram. In these cases there are isolated or multiple swellings which are circumscribed and not peripheral. Sometimes caries and necrosis takes place, especially if suppuration has supervened, and the loss of integrity of the periosteum and the underlying bone is clearly pictured. Dental injuries frequently produce maxillary bone periostitis, and a Roentgengram will readily differentiate same

from neuralgia or neuritis. In periostitis gummosa, infiltration of the gummatous deposits causes a raising and swelling of the periosteum and the Haversian canals, and the nutrient marrow channels enlarge and become filled with gummatous material. This swelling of the periosteum and the invasion of bone in secondary syphilis produces a characteristic bulging; a bow-like curve is especially noted at the tibial upper or



Fig. II.—Traumatic periostitis.

middle third and is readily distinguished upon the photographic plate.

II. *Congenital Deformities*.—Congenital or acquired deformities of bone are readily distinguished, so that little need be said on this point. The print showing congenital deformity of the hands is interesting as presenting a lesion resulting from a strong maternal impression received during the fourth

or fifth month of pregnancy, when a dog snapped at the hands of the pregnant mother and caused her to faint away. Aside from this abnormality the child was born normal and lives a useful life.

The deformed spine, with enlarged lumbar vertebræ and intervertebral disks, represents the case of a young woman



Fig. III.—Congenital deformity.

who has borne four children and whose deformity has so increased of late as to impel her to seek medical aid. There is a history of the mother of this patient having had a rapid labor and dropping the child upon the floor while having a strong labor pain. The trauma has slowly developed the deformity—which can be called *ostitis deformans*.

Acromegaly can be readily diagnosed without the aid of the Roentgen ray, the pictures merely tending to emphasize the findings of the physical examination.

III. *Chondroma*.—*Chondroma* or *Enchondroma* is found most frequently in the metacarpal and phalangeal bones, but may also occur in other long bones, as the humerus, ulna, radius, and femur. *Enchondromata* of the ribs and other bones

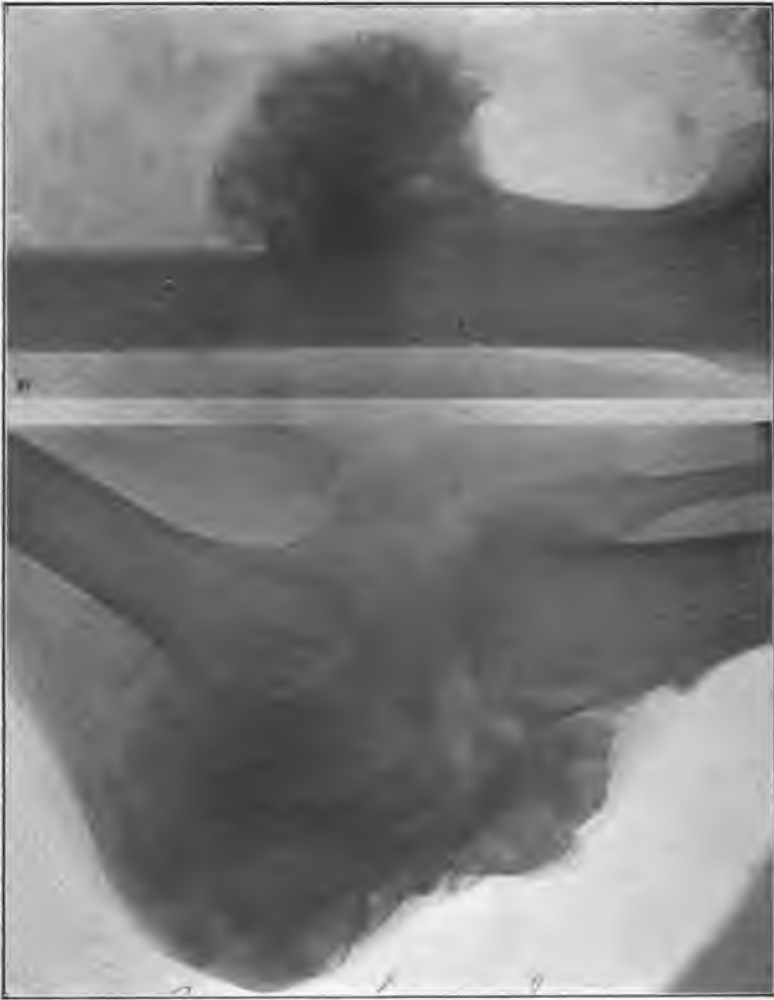
of the skeleton have also been noted. These cartilaginous tumors appear homogeneous (similar to sarcoma); they have, however, islands of bone interwoven with the homogeneous



Fig. IV.—Chondroma (from Rumpel).

mass, giving it a net-like appearance. The cartilaginous portions throw a lighter shadow than the bony parts, and gradually invade the osseous structure and replace it.

Chondromata do not affect the periosteum, which latter is an important diagnostic point. When these chondromata calcify, a mixed tumor, osteochondroma, is formed. Sarcomatous



Figs. V. and VI.—Ex-ostosis of femur (from Rumpel).

degeneration may also supervene and chondro-sarcoma be the result.

IV. *Bone-cysts*.—Bone-cysts may follow various lesions of the osseous system; osteitis, with fibrosis following same, fre-

quently antedates cystic changes in the bone. Trauma is also a common cause. The cysts may be single or multiple and appear *within* the bone substance.

Radiographically a clear light space is noted within the bone (not interwoven with darker lines like enchondromata).

The periosteum is not affected, which differentiates the trans-



Fig. VII.—Enostosis. Suspected osteo-sarcoma.

parent homogeneous shadow which is similar to sarcoma. In the latter lesion the periosteum is rapidly involved.

V. *Osteoma*.—Osteomata, while generally associated with the osseous system, may also occur in soft tissues (lungs, parotid gland, meninges, etc.). Small bony growths are designated as *osteophytes*; when the tumor extends over a larger area, *exostosis*; when the growth is confined to the center of bony structures, *enostosis*.

Bony tumors may also spring from the enamel of teeth and are called dental osteomata; when developed from the pulp they are designated as odontomata. Osteomata are classed as hard and spongy and may be single or multiple, most commonly the latter.

Tumors of any description containing calcareous infiltration of bone structures are easily diagnosed by the Roentgen ray.

All exostoses present irregular outlines, show the dark shadows of osseous tissue and an absence of periosteal involvement, and have a slow growth. They must be differentiated from osteo-sarcoma: the latter have involvement of the periosteum, more regular outline, lighter, more homogeneous appearance of the tumor shadow, and more rapid development. The soft tissues are more quickly invaded in sarcomatous growths. Osteo-sarcomata are usually single; osteomata are frequently multiple.

VI. *Osteo-sarcoma*.—The ability to diagnose osteo-sarcoma by means of the Roentgen ray is of incalculable value, as the earliest possible removal of a sarcomatous growth is essential to save metastasis and life. The prompt surgical removal of small sarcomata, followed by long continued radiation about the affected area, has been successful in a number of cases under our observation for the past eight years.

Osteo-sarcomata may be periosteal or myelogenous or mixed. The favorite location is the end of long bones; rarely, if ever, are the epiphyses the starting-point, although the tumor may spread there by continuity of tissue.

The osteo-sarcoma starts as a sub-periosteal growth, raises the periosteum, separates it from the bone, and gradually involves the whole circumference of the periosteum which may be destroyed from pressure. True sarcoma tissue looks homogeneous and produces a pale, light shadow compared with ordinary osseous tissue. It rapidly spreads into surrounding soft tissues and is not confined to bone.

Giant cell sarcoma is frequently found centrally located within the medulla of bone, destroying bone tissue and leaving a homogeneous center. If these are discovered early, thorough chiseling, drilling, and curetting will prove efficient and obviate amputation.

Osteo-sarcoma must be differentiated from bone cysts, osteomyelitis, syphilitic gumma, tuberculosis of bone, and osteomata.

Osteomata have more irregular outlines, darker tumor shadows, and do not involve the periosteum.

Bone-cysts are intra-osseous and have a regular homogeneous outline (like sarcoma); the latter, however, quickly have extra-osseous extension with involvement of soft tissues. In addition, bone-cysts are often multiple; sarcomata are not.

Osteo-myelitis is also intra-osseous with destruction of bone, and, if abscesses supervene, the surrounding tissues show marked darkened areas due to osteitis.

Tuberculosis of bone shows an indefinite pale shadow of tissues with atrophy of bone.

Syphilitic gummata throw a dark, almost black, shadow and produce a spindle-like protrusion of the periosteum with irregular knobs and cover a large area. The periosteum may be destroyed in some places. In sarcoma the bulging out of the periosteum is more localized and not fusiform and does not affect as large an area as syphilis; sarcoma also rapidly invades soft tissues.

Gouty tumors have been mistaken for sarcoma, but the shadow is much darker, and characteristic tophi are usually found associated with it in other parts.

VII. *Osteo-myelitis*.—*Osteo-myelitis* is diagnosed only by the Roentgen ray when distinct pathological changes in the bone have occurred. This may require some time, the older the lesion the more easy is the diagnosis.

Osteo-myelitis presents four points for Roentgen diagnosis:

- (1) Ossifying periostitis and osteitis; (2) sclerotic changes;
- (3) abscesses and cavities; (4) sequestra of bone.

The shaft of the distal end of bones is the favorite site; there are centrally located, circumscribed, clear spaces with surrounding darkened areas (due to osteitis) and coincident periosteal enlargement, sometimes destruction and darkened shadows of same.

Osteo-myelitis is distinguished from sarcoma from the fact that the latter invades surrounding tissue, while the former is confined to bone. *Osteo-myelitis* presents a destructive process; sarcoma a proliferating process. Sarcoma also prefers the ends of the shafts and commences as a sub-periosteal growth.

Necrosis and caries are readily diagnosed upon the plate, and sequestra can be defined and readily located.

VIII. *Tuberculosis of bone.* Tubercular osteo-myelitis.

Tuberculosis of bone is characterized by faint, indefinite shadows due to lack of lime-salts. There is an absence of periostitis and no dark sclerosed areas, and atrophy of bone

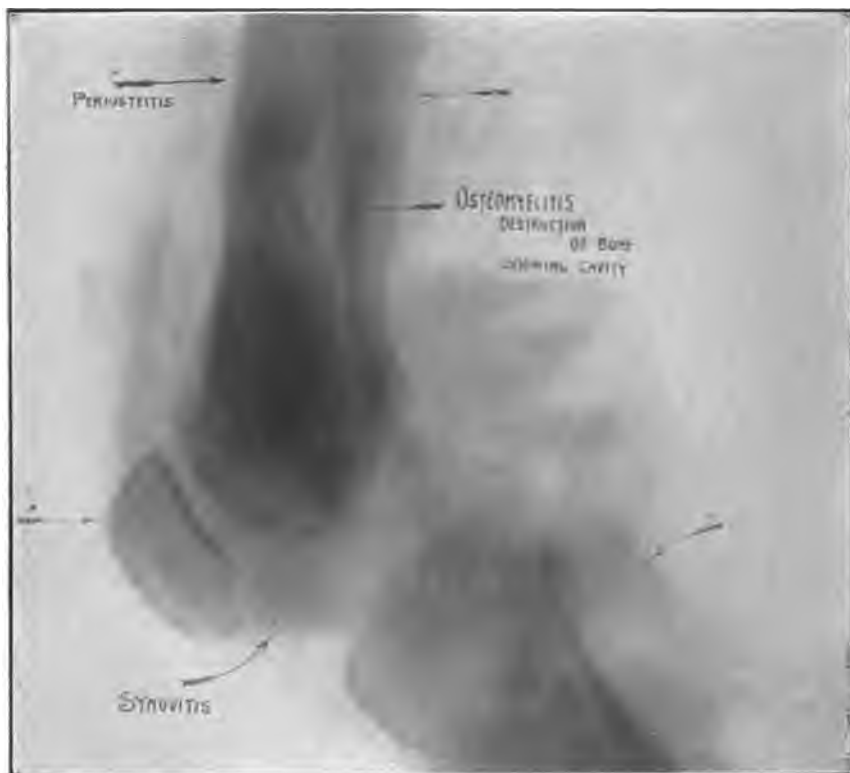


Fig. VIII.—Osteo-myelitis.

supervenes. Macroscopically the joints may appear enlarged but the bones themselves become atrophied.

Tuberculosis of bone occurs most frequently in the center of the epiphysis or below the articular cartilage, preferring the long bones, femur, humerus, radius and ulna, and lower extremity, and in children especially the vertebræ.

Tuberculosis of bone presents little difficulty in differential diagnosis; the radiographic points are:

- (1) Pale indefinite shadow of the bone, devoid of contrast;
- (2) atrophy of bone substance; (3) epiphyseal preference;

(4) enlargement of joints; (5) lack of periosteal involvement; and (6) lack of sclerosis.

Tubercular dactylitis must be differentiated from syphilis and osteo-myelitis. The latter rarely attacks the epiphysis, excepting by extension, being an intra-osseous lesion. Syphilis presents a dark shadow with marked involvement of the peri-



Fig. IX.—Tuberculosis of the hip.

osteum, forming a dark ring or band about the bones. The tubercular dactylitis has no periosteal involvement and the bone itself appears pale, excepting at the site of a circumscribed abscess, where dark single shadows will appear.

IX. *Osteo-malacia*.—The writer has not seen a radiograph of a case of osteo-malacia, but theoretically the absence of lime-salts and decalcification of bone would cause a characteristic absence of shadows on the plate.

X. *Rickets* presents no diagnosis difficulties, but in doubtful cases the Roentgengram will show the characteristic enlargement of the ends of the bones.

XI. *Syphilis*.—The Roentgen ray has been of great service in the diagnosis of syphilitic bone lesions. Congenital syphilis, lues hereditaria, lata, and gumma show characteristic shadows upon the photographic plate.

In congenital syphilis there is periosteal enlargement about the metacarpal bones or phalanges, or the metatarsal or tarsal bones may be affected similarly. The periosteal shadow appears like a cloak hung about the bone and is characteristic of congenital syphilis.

Syphilis does not present atrophy of bone such as is found in tuberculosis; in the latter the periosteum is also not affected.



Fig. X.—Congenital syphilis.

When we appreciate that the *spirocheta pallida* may enter the body in numerous ways aside from sexual contact, such as smoking, drinking from infected cups, kissing, handling of coin which had been in contact with a mucous patch, examination of syphilitics and infection through contact as from an abrasion, hang-nail, etc.—any measure which will assist in clearing up questioned diagnosis in suspected cases should be welcomed.

Syphilitic periostitis or gummatous periostitis gives a characteristic Roentgen ray picture.

I. Irregular contour of the periosteum:

II. When continuity of periosteum is destroyed, the tissue looks as though moth-eaten or reticulated.

III. There is always sclerosis of bone with darkening of its shadow about the gummatous process.

IV. In certain locations, as the anterior surface of the tibia, a curve or bow-like protrusion is formed from the bulging out of the periosteum.

V. There is no atrophy of bone. (In tuberculosis there is.)

Differentiating these points from other bone lesions we have in (1) periostitis due to trauma, no involvement of the bone

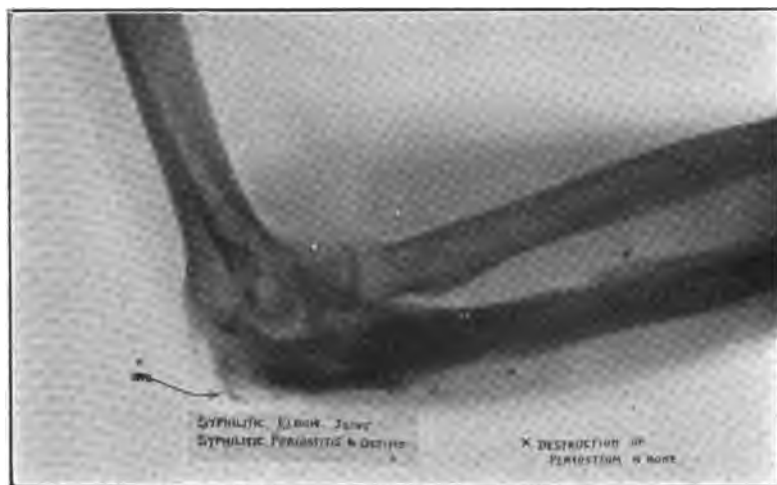


Fig. XI.—Syphilitic elbow-joint.

itself and lack of irregularity; also lack of area of involvement.

(2) Acute osteo-myelitis: This disease lacks the irregular contour of syphilitic periostitis, having a smooth surface as a rule. The involvement is usually smaller and osteitis is not as marked. Osteo-myelitis is usually confined to the shaft and has little or no periosteal involvement.

(3) Peripheral sarcoma—this lesion has circular periosteal enlargement of the affected bone, and the sub-periosteal involvement presses out the periosteum, which it soon destroys, involving neighboring tissues. The sarcomatous tissues have a lighter shadow than the gummatous tissues, while the gumma is confined to bone and periosteum.

(4) Tuberculosis of bone—here there is no sclerosis, hence no dark shadow of bone-substance, and, while enlargements of

joints are noted similar to syphilis, the bone itself tends towards atrophy. In syphilis there is hyperplasia with characteristic periosteal enlargement and necrosis. Gummatous lesions are often multiple and, as already stated, in the tibial region have a typical hump-like enlargement of the periosteum and sclerosis of the underlying bone, so that these dark shadows cannot be mistaken for anything else.

Cor. Broadway and 56th St.



LIGHT MODALITIES IN THE TREATMENT OF DISEASE.*

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Member American Electro-Therapeutic Association, Member National Association of Physical Therapy, Member and ex-President Pennsylvania Society of Physico-Therapy.

I have taken for my subject *Light Modalities in the Treatment of Disease*, first because it is a subject in which you are all deeply interested as well as because light is one of our most valuable therapeutic agents, and again light has not received the amount of careful study and clinical investigation that its importance as a therapeutic agent demands.

When the all-wise Creator bathed this mundane sphere in light He gave to the earth and every living thing the greatest blessing, because without light no organic life would be possible. With light and its twin sisters—air and water—we have the very essence of life, health and happiness. The study of light application to the cure of disease marks one of the most brilliant achievements in modern physiotherapy. The great discovery and work of Roentgen—probably the greatest discovery of the nineteenth century—has never been able to obscure or dim the brilliancy of the work done by Finsen and his pupils. The practical and far-reaching results obtained by the scientific application of light to the cure of disease have gained for this measure a high and lasting place in our armamentarium for the battle with disease and death. In view of the fact that we are as yet only on the threshold of this rich and wonderful storehouse, it behooves us by investigation and study to add to the sum total of the knowledge on this interesting subject the result of our experiences, so that in time a more perfect knowledge and a scientific working formula may be established. Among the many valuable agents that the modern physio-therapist has at his command surely light in its various modalities must in the future hold a very high place. Together with air and water it represents a disease-preventing and a disease-curing agent of far-reaching im-

* Read before the American Electro-Therapeutic Association, at Boston, September 19, 1907.

portance. It is one of the elements without which life is impossible. Upon this point there is and can be no doubt. Not all medical men, however, seem to realize that the hygienic value of light is no greater than its curative power in diseased conditions. In considering light as a health-giving and health-restoring agent, it is necessary for us to try to understand the influences that it exerts upon the different phases of animal life, and particularly on those functions which are included under the head of metabolism. If the absence of light is capable of retarding growth and producing disease, is it not fair to suppose that the presence of light is capable of increasing growth and destroying and curing disease? We may safely assert that the human body requires light for its sustenance and that without light all higher forms of life would be impossible. The most vital of all physiological functions, both pulmonary and cutaneous, is markedly affected by the presence of light. The amount of oxygen taken up by the tissues is in direct proportion to the amount of light to which the body is exposed. During the day the tissues take up larger amounts of oxygen and give off a relatively larger quantity of carbonic acid. This is in part due to the greater amount of oxygen in the air during the day and partly due to the greater power of the tissues under the influence of light to absorb and assimilate. In the peaceful eventide when the sun, the great fountain of light, nears the horizon and leaves the world to darkness, all Nature seems to be lulled to rest in the cradle of universal silence; the evidences of activity disappear, darkness supervenes and envelops the universe, and a desire to rest becomes manifest throughout the entire living creation, and the human organism, which is a part of this living creation, shares in this general depression of vitality; its machinery weakens under a lower pressure, physiological respiration becomes more superficial, assimilation less active and excretion more sluggish.

The more fully organized the structure, the more marked the change becomes in the absence of light. Only the lower forms of life—fungi and other micro-organisms—flourish in the absence of light.

In view of these facts we can readily understand how conditions that are due to perversion of metabolism, and which are produced by the action of bacterial life, are of necessity dependent upon the presence or absence of light. The re-

searches into the action of light on living tissues have revealed many interesting facts. It has been shown that light will affect the contractility of protoplasm, the red blood corpuscles in their direction and speed, and that certain infusoria and diatoms are directly affected by light. The contractility of the muscles is greater under the influence of light, the hemoglobin of the blood is markedly increased under the influence of light. That light is destructive of bacterial life was suspected long before the time of Finsen. Esmark, as early as 1870, exposed his instruments to light for the purpose of disinfecting them; in fact, light occupies the position of universal disinfectant, for without it the purification of our rivers would be impossible, and water which becomes comparatively healthful would be unfit for use.

There is no longer any doubt but that pathogenic bacteria are affected by light. In order to understand the therapeutic value of light it is necessary to study the physics of light. If a beam of sunlight, or one from an arc light, is made to fall upon a prism it will become broken up into its component parts or rays. The arrangement of these component rays is technically known as the solar spectrum. It having been shown that the spectrum of the arc light is practically identical with that of the sun, the difference being one of degree and not of kind, it can reasonably be assumed that the therapeutic value is at least similar, if not indeed identical.

Clinical and spectroscopic observations have proved the truth of this statement. Different visible rays in the solar spectrum, each of which is due to a different rate of ethereal vibration and wave length, are red, orange, yellow, green, blue, indigo and violet. Each of these modalities is capable of making an impression on the human retina, giving us color perception, and are known as visible rays. In addition to the visible rays there are numerous invisible rays at either end of the visible spectrum (infra) red, and ultra-violet rays. Some of the rays, notably red, and more especially from the infra-red field, produce heat and are known as thermic rays. Other rays, notably yellow and green, are light-producers and are known as luminous rays. The rays of the blue, indigo and violet, and especially the ultra-violet field, are capable of producing chemical changes in organic substances, and are therefore known as chemical or actinic rays. The most powerful

rays emanate from the ultra-violet field and are invisible. There is a general misunderstanding of the term ultra-violet,—many persons believing that ultra-violet means intensely violet,—but such a view is totally erroneous, the term ultra-violet referring only to the field from which they emanate, and not to the color, as ultra-violet rays are invisible.

In 1893 the late lamented and immortal Finsen of Copenhagen, Denmark, published the result of his biological researches in reference to the action of the different rays of the sun and the electric arc light, more especially of the chemical rays of light with the thermic and luminous rays eliminated. The effect of the chemical rays plays a most important rôle in all the life processes of the universe. They are the underlying, pulsating motive force by which the growth and development of every living thing around us is made possible. From the life processes within the smallest living organism to the purification of the vast bodies of water in our rivers which carry the excreta of millions of people, and which furnish healthful drinking water for our large cities, but which were it not for the germicidal and purifying effect of light, would carry decay and death to countless millions. Finsen was not slow in applying the valuable knowledge gained by his researches. His first attempt to apply light to the cure of disease gave the sanction of science to what had been empiricism since the days of Hippocrates.

It marked the birth of modern photo-therapy and elevated it to the position of an exact science with an extensive field for its therapeutic usefulness. The publication of Finsen's researches attracted universal attention to himself and his work. It pertained to the scars of smallpox, which Finsen showed to be due to the disintegrating effect of the chemical rays of light; he reasoned that the scare could be lessened if the patient could be protected from the effect of the chemical rays. By experiment he proved that chemical rays will not penetrate red media and he proceeded to apply this fact in a practical manner by having the windows painted red and causing the walls to be covered with red paper; in fact, by interposing red everywhere in order to intercept the chemical rays. His efforts were rewarded by the very ample proof of his contention.

The proof that chemical rays will not penetrate red media is verified every day in the photographic art. The germicidal

action of the chemical rays prompted Finsen to apply them in infected diseases of the skin. The classical example of a condition of this character is lupus or tuberculosis of the skin. Finsen devised an apparatus for this purpose. He concentrated the chemical rays by eliminating the heat and luminous rays from the mass of light emanating from the generating source, which was either the sun or a powerful arc light. By causing the light to pass through a sheet of water all the heat rays were practically eliminated and a cold beam of light was procured. He further aided in eliminating the heat rays by adding certain coloring substances to the water. But at the same time he found that many of the chemical rays were lost; his object was to get as powerful concentration of chemical (ultra-violet) rays as possible. In order to attain this end he used suitable lenses. The concentrated rays were then directed to the part to be treated. Finsen found by spectroscopic analysis that the ordinary glass lenses were unsuited for the purpose because the glass absorbed a very large proportion of the chemical rays. In order to overcome this obstacle he substituted lenses made of quartz crystal, which allow the chemical rays to pass. He also found that blood absorbs chemical rays. The experiment by which he established this fact, while probably familiar to most of you, is nevertheless worth stating here.

Finsen's helpmate in his great work was his devoted wife, who gladly offered herself as a subject for further experimentation, whenever her distinguished husband, after experimenting upon himself, desired further proof for any of his investigations. Finsen placed a piece of sensitized photographic paper in direct contact with the posterior surface of his wife's ear, and directed a beam of chemical light against the anterior surface. He found that no matter how long he continued the exposure no effect was produced on the sensitized paper. He then placed the ear between two pieces of quartz crystal and by pressure rendered the ear anemic, and upon repeating the experiment the paper was blackened almost instantly, showing that the blood in the previous attempt had prevented the passage of the rays of light. From this experiment he reasoned that the part to be treated, particularly where penetration is desired, should be covered with a piece of quartz crystal and rendered anemic by pressure. Thus was

he drawn step by step to elaborate the technical details of the method which has become such a potent factor in the treatment of a variety of conditions. The essential features of a Finsen light are a source of chemical light, a large condensing lens for the purpose of concentrating the rays, a water-cooling device through which the light passes and loses all of its heat rays, a small condensing lens of crystal glass for the purpose of recondensing the rays as they emanate from the water, and a small compression lens with which to render the parts bloodless. These essential features are embodied to a certain degree in all the various apparatus which have been devised for the application of the principle devised by Finsen.

Finsen's apparatus has many disadvantages in construction, as well as in its great cost, and many attempts, more or less successful, have been made to modify, or rather simplify, the original device.

The best known portable device for the application of the Finsen idea is probably the one known as the London hospital lamp; it is simple in construction, easy to handle, and gives a very satisfactory output of chemical rays and is comparatively cheap and in every way a very satisfactory instrument. There are a number of other types on the market with more or less merit. Many investigators of ability have experimented with a view to determining the germistat properties of chemical rays on different forms of bacteria. Kallenbacker used the rays from an arc lamp from a distance of 10 centimeters, using 5 amperes, 40 volts direct current. He used 15 per cent. nutritive gelatine for a culture medium for gonococci and tubercle bacilli, 2 per cent. glycerine agar covered with sterile blood serum for typhoid and other germs. The germs were grown in surface cultures at a temperature of 35° C. to allow for the slight degree of increased heat from the lamp. Inoculations from the rayed culture on glycerine agar were made after 48 hours, the new culture being kept at a temperature of 35° C. for another 48 hours. The relative vitality of the new culture was taken as a criterion for the relative germicidal action of the light. After an exposure to ultra-violet rays a space of 1 second there was no retarding effect on typhoid germs; after 3 seconds exposure the vitality was remarkably reduced, after 30 seconds, vitality almost destroyed, and after an exposure of 60 seconds the culture was dead.

Comma bacilli after 5 seconds no effect, after 30 seconds marked impairment, after 2 minutes death.

Tubercle bacilli: slight impairment after 5 seconds, marked impairment after 30 seconds, death after 2½ minutes.

Micrococcus gonorrhoeicus: slight impairment after 5 seconds, after 30 seconds marked impairment, after 2 minutes death.

Bacteria coli communis: impairment after 30 seconds, and death after 2 minutes.

Streptococcus pyogenes: impairment after 30 seconds, death after 2 minutes.

Anthrax: impairment after 5 seconds, death after 30 seconds exposure.

Thus it will be seen that chemical light has a marked germicidal power. In the type of lamps now generally in use the luminous rays are not eliminated, Finsen in his subsequent experiments having shown that this is not necessary; in fact, there is probable advantage in including the luminous rays, and it is quite possible that they rather tend to enhance the germ-destroying effect.

Luminous rays have a vitalizing effect on tissue growth as well as some germicidal effect, and have as well a great affinity for oxygen and would therefore tend to increase the action of the chemical rays. The important thing is to get rid of the heat rays.

The Physiological Action: If a beam of chemical light is permitted to fall upon healthy skin the result, if continued for a considerable time, will be a marked erythema followed by local irritation, dermatitis, molecular death, followed by desquamation.

The tanning of the skin in the summer time is due to the deposit of pigment, pigment being Nature's safeguard against the destructive action of chemical rays, the latter being absorbed by it.

Chemical light has a disintegrating action upon living tissue; the greater the resisting power of the tissue, the less will be the destructive action of the chemical rays. Morbid tissues having less power of resistance the destructive action of the rays is more marked on tissue wherein tuberculous or other bacilli have found lodgment.

The treatment of lupus is a classic example of the physio-

logical action of chemical rays. Here the germ-destroying power of the light strikes at the very root of the disease. Healthy action is stimulated by the attraction of oxygen to the parts. The morbid tissues are disintegrated by the rays and by this means a healthy reaction is produced, which tends toward a restoration to the normal condition; thus the consistent and persistent applications of the chemical rays are to be resorted to in all parasitic diseases of the skin, such as lupus, sycosis, tinea, certain forms of eczema, psoriasis, disease of the hair follicles, furuncle, carbuncles, alopecia, etc., furnish a wonderfully rich field for successful clinical work.

More recent investigation and clinical test have shown that the energy emanating from the arc light (chemical rays) has marked influence on at least some diseases of the deeper seated organs.

Cleaves reports marked benefit from treatment in the electric arc cabinet in pulmonary tuberculosis, bronchitis, neurasthenia, certain nervous diseases, neurosis, etc., and I have no doubt but that further study and clinical application and observation will greatly widen the field for this wonderfully potent agent.

My remarks thus far have been limited to light energy as emanating from the arc lamp, but I cannot close without devoting a few words to the great value of another form of radiant energy, namely incandescent electric light, desiring only briefly to point out its great value in certain conditions which come daily to the notice of the physio-therapist—conditions in which no other modality at our disposal has given such gratifying results as the incandescent electric light bath, either local or general according to the conditions to be met.

While the incandescent light has some of the properties of the arc light, yet there is a very great difference, so much so that the incandescent light has a very wide field of usefulness separate and apart from the more active chemical ray.

The physiological effect of the incandescent light is due first, and I may say chiefly, to radiant heat, secondly, but much less markedly, to chemical energy.

The chemical energy, so far as the blue violet is concerned, is small and of the ultra-violet not at all.

The different frequencies of the spectrum may be chemical, luminous, or thermal according to the physical properties of the substance or structure upon which they fall.

It is not fully determined whether the slower and longer frequencies below the blue have any chemical action upon living tissue, nor has it been proven that they have not.

It is known, however, that they have the power of penetration and that there is absorption above the red. We know that penetration and absorption do not take place without an expenditure of energy, though the exact nature of the work is not fully understood.

In the incandescent bath, while the blue violet frequencies are to be taken into account, they are but slight in a single unit, but when multiplied 50 or 100 times they have a considerable value.

Therefore the physiological effect of the incandescent light must be ascribed in part to the chemical frequencies as well as to the more potent thermal energy.

The resistance of the body tissues serves to transform this twofold energy into thermal and chemical energy.

The skin, while a poor conductor of heat, transmits radiant energy readily.

The heat enters the body in the form of a radiant force and in this form is absorbed by the tissues and transformed into heat units.

The heat in this case is not confined to the surface as is the case with conducted heat from water vapor or the Russian or Turkish bath.

It does not seem likely that the penetrating light rays below the blue, i. e., the red, yellow and green, when considered in relation to molecular activity, owing to their wave length and slow frequency have any chemical action, but that they undergo transformation into heat in the deeper tissues.

This action is in turn followed by marked sedation brought about by the sudden and intense drainage through the skin of the accumulated products of disturbed metabolism.

Therapeutic Indication: Incandescent light baths have been found to be of very great value in cases of lowered nutrition due to imperfect assimilation and defective elimination; in the acid diathesis, rachitis, osteoma, in obesity, biliary lithiasis, gravel, diabetes, arthritic manifestations of gout and rheumatism.

In alterations of the blood state such as anemia, chlorosis, lympho-stasis and syphilis; in such nervous diseases as the

neuralgias due to toxemia, hysteria, and certain psychoses; in such respiratory disturbances as bronchitis, bronchial asthma; in nephritis; in chronic tubercular ulcers, inflammatory diseases of the bones, chronic leg ulcers; in paralysis and trophic disorders; in toxemias due to alcohol, drug or chemical poisons.

In fact, in all cases of perverted metabolism when increased elimination is desired, it is the most potent remedy at our command.

Therapeutic Action: First, there is a profound action on the vaso-dilators. By the stimulation imparted to them a large amount of blood is permitted to flow to the surface.

In this way the heart is relieved of its burden by the lowered arterial tension, the arterial and capillary constriction being lessened.

That (1) a marked effect is produced upon sensory centers is evidenced by a diminution of nerve irritation and debility. (2) There is established a marked sedative effect by the dilatation of the cutaneous vessels; (3) There is a most profound action upon the sweat glands with a greatly increased eliminative activity.

The results from these combined effects are a return to normal skin activity, normal circulation and oxidizing power upon the part of the organism. The general tone is increased, and with this physiological resistance.

There remains much more to be said on this subject, but to do so would be to carry one much beyond the time allotted me. I should have liked to take up the mechanism of light therapy, but must leave that for the future, contenting myself with the hope that what I have said will serve to stimulate discussion and lead to further study or investigation of this very great subject so full of wonderful possibilities for the physio-therapist.

5530 Germantown Avenue.

(To be Continued.)

NEURASTHENIA AND OCCUPATION NEUROSES:
THEIR TREATMENT WITH ELECTRICITY.*

BY WALTER H. WHITE, M.D., BOSTON, MASS.

Neurasthenia is divided by Starr, as to cause, into predisposing and exciting, the latter of which he says are numerous. Savill says that these two classes are interchangeable, and, therefore cannot be sharply and accurately separated. He (Savill) says that there are six ways in which functional nervous diseases may arise: (1) where some structural change really exists, though we have failed to discover it, as in paralysis agitans, tremors, and clonic spasms; (2) when toxic substances have been introduced into the body from without, as in microbic diseases, diphtheria, or grip; (3) when toxic substances are produced within the body, as of glandular excretions into the blood, from foods undigested or too long retained in the system; (4) when the nutrition of the nerve tissue is defective, as in anemic states of the blood or exhaustion from over use; (5) when deficiency or excess exists in the quantity of blood to a part, through derangement of the vaso-motor nerve action; (6) from increased reflex irritability, as at the menopause, or puberty. Neurasthenia is most prevalent in the United States, and more common with men than women. The French speak of it as "Americanitis." Is it to be wondered at with the universal rush to do the work of two days in one? The same is true from the bolting of meals, and excess in eating as well, so that gastric symptoms are frequently present. Most of the cases occur between the ages of thirty and sixty years. In 103 cases 39 were with intestinal symptoms, and 30 were gastric, and 4 were from nervous fatigue, as quoted from Savill. National temperament plays a part in the study of medical works; these were English patients, whereas with the Latin races the nervous element might be present in a larger percentage. In the clinic of Professor Krafft-Ebing, of Vienna, he used to say that the strict discipline of the army, with abuse of the men by the under officers, accounted for a large percentage of the nervous diseases in men in that country. Pyorrhea as a cause of the gastric

* Read before the New England Electro-Therapeutic Association, April 10, 1908.

symptoms in youth and the poorer classes; also eye strain as the cause of headache should not be overlooked. Constipation, insomnia, ovarian sensitiveness in the female, and prostatic enlargement in the male are common in these cases. The symptoms are varied, and often vague. Exhaustion might be mentioned as the principal symptom, also lack of power of concentration, or inability to put his mind on his work, and forgetfulness. These latter symptoms are most frequently spoken of by the patient, together with the favorite expression, "Pain at the base of the brain." The sexual class of symptoms, frequently not spoken of by the patient, are usually the result of self-abuse or sexual excesses. Nocturnal emissions are the cause of mental depression. The patient's family and friends are frequently not in sympathy with them, causing them to become secretive, saying that they do not wish to be complaining all the time when they are told there is nothing the matter with them. The cerebral symptoms present are pulsations, pressure at the back of the head, The headaches vary, being worse in the morning and frequently subsiding towards night. The spinal symptoms are tenderness on lying down, from pressure, a light touch often giving more distress than heavy pressure. These pains radiate about the body or down the limbs, with hypersensitiveness to heat or cold, usually the latter, often present. A thorough examination of the patient as to the heart's action, examination of the blood for anemia, which is not always noticeable, examination of the urine for urea, phosphates, and spermatozoa are to be made. Obtain the confidence of the patients and do not slight any symptom they may speak of, as they are very real to them, though you may think they amount to nothing; or you may find that your patient has gone to some other physician.

Treatment: For insomnia, if present, place the patient on a table, reclining upon the stomach, and administer the electric light through a blue screen, holding the light some distance over their head for the space of two or three minutes, then slowly pass it down the spine, then begin at the neck and pass the light down over the spine as before. The vibrator may be used with equally good effect, beginning at the upper cervical vertebra and continuing down the spine. In giving treatments with the vibrator pressure must not be made upon the spine itself, but at the side between the spinous process, over the

posterior branches of the spinal nerves. A fair amount of pressure should be employed with light stroke, gradually increasing the power of the stroke as you go down the spine. For the gastric symptoms prescribe an easily digestible diet. See that the patients have something to occupy their minds; either some light work, or as a recreation, riding, golf, hunting, fishing—something to keep them out of doors as much as possible. Eliminate social functions, teas, bridge-whist, parties and the like, or whatever may have been the cause of their condition. The various electrical modalities play a most important part in the treatment; often more than one form may have to be used with the same patient. I cannot say that I prefer one modality more than another, the particular one to be decided by the symptoms of the case. The constant current in central galvanization and in the treatment of the spinal cord. The static breeze to the head, and a strong effleuve from the static or high-frequency machine, down the spine and over the arms and legs, seems to stimulate or equalize the circulation of those who complain of cold hands or feet. The stomach symptoms are relieved by the combined or galvano-faradic current to the pneumogastric nerves; a small pad from the anodal pole being applied at the throat over the nerve, and a larger pad from the cathode over the epigastric region. The static wave current with a metal electrode bound on over the stomach and connected to the positive pole of the static machine, grounding the negative pole, the poles of the machine being closed together on starting and gradually drawn apart until there is a spark-gap of three or four inches. Constipation from atony of the intestines may be treated either by the static wave current, a ball electrode being connected to the positive pole of the machine and pressed over the cecum and passed over the ascending, transverse, and descending colon, or by intra-rectal treatment by the static wave current as strong as the patient can bear. A combination of mechanical vibration and the high-tension induced current, employing an electrode fastened to the vibratode, the electrode being inserted into the rectum, the other electrode being a pad upon the abdomen, the patient thus receiving the effects of both.

The slowly interrupted induced or the sinusoidal current may be used with an intra-rectal electrode. The ovaries are to be treated with the ovarian ball electrode con-

nected to the anode and using a continuous current of 40 volts, 15 to 20 ma., the strength of the current to be governed by the sensation of the patient. The cathode attached to a pad of 150 sq. cm. should be applied over the sensitive ovary. Prostatic treatment should be employed by means of a prostatic electrode inserted into the rectum against the prostate with the indifferent electrode over the symphysis pubis, employing the coarse wire of the high-tension coil. We know the effect of the x-ray upon the generative organs which may be used to good effect upon the prostate, the patient being placed upon the table, face downward, and the x-ray given with a high tube. Personally, I prefer the high-frequency current with a metal or glass electrode inserted in the rectum.

Occupation or Professional Neuroses.—Writers' cramp, caused by fault in holding the pen, too small penholders, producing too much strain upon the muscles of the forearm and hand. The spastic form is the most common, with cramps of muscles of the thumb and first two, sometimes including the third, finger, neuralgic pains in the arm. The tremulous form occurs when the patient tries to write with a trembling of the hand and arm. With the paralytic form the patient is unable to hold the pen owing to lack of muscular control.

Treatment: Change the style of penholder to the large, round one, or make use of the typewriter. Treatment with the combined current, employing 5 to 10 ma., 5 to 10 minutes, placing the anode over the cervical vertebræ, and using the Erb ball electrode covered with cotton to the affected muscles is sometimes beneficial. The same form of treatment would apply to other forms of occupation neuroses resulting from using the fingers in a cramped position or for too long a time.

220 Marlborough Street.

Discussion.

President:—You have listened to this interesting paper, and we will be glad to have anyone having experience with such cases discuss it.

Dr. Morse:—I think I have said enough already, but I will say that I am always pleased to hear Dr. White. There is lots to be said on his subject. Many cases of nervous prostration can be treated by bromide and change of air, and high frequency, and a relief of tension and the nervous symptoms. Another case, arising from intestinal or stomach trouble, comes

under the head of auto-intoxication. I do think that these two classes of cases have many prominent symptoms.

Dr. Granger:—I wanted to be sure to hear Dr. White's paper, even though I was sorry to lose Dr. Morse's. I was much interested in his use of the blue light in cases of insomnia. Some of these are very persistent and trouble a great deal, and I thought I had tried almost everything, but had never tried the blue screen. I have one case where I shall put it into effect immediately. As Dr. White and Dr. Morse say, auto-intoxication is the basis of three-fourths of the cases of neurasthenia, and that, plus some nerve reflex, due to severe nervous strain, or disease in the nose or prostatic enlargement or some pelvic condition, comprise 90 per cent. of all cases of neurasthenia, and treatment directed to the elimination of these causes will in time effect a cure. In all these cases it is necessary to assure the patient that there will be days when they will feel "blue" and discouraged, for if we do not mention this first, when the "blue days" come they will conclude that the treatment is no good and they might as well use New Thought or Christian Science or the Emmanuel Church.

Dr. Allen:—I am not sure that we have taken lessons enough from the Emmanuel Church and Christian Science. I have been watching that line and have had good experience in twenty years in the treatment of these cases. The first thing to do is to remove any obstruction. Many of these physical conditions are partly mental. Begin and impress on the patients that you will do something for them. One of the great issues is sympathy; they are "blue," and some environment often causes these troubles, but I have taken pains to go to the Emmanuel Church and have investigated many psychological conditions and have taken pains to read "Schofield's Force of Mind." He states the ground work that leads up to that line of thought. Look into the psychology.

Dr. Knowlton:—I was much interested in the paper. We all meet with more or less of this condition; the speakers have been putting stress on the mental side of neurasthenia, and a doctor of Glasgow states that if we are to be successful in treating these cases we must bear in mind the fact that there is a mental element in every case. I would suggest as a cause the disturbance of the nutrition of the nerve element, causing the constant, persistent disturbance of the nutrition of the nerves. I believe there is a physical basis. We cannot exactly leave out the initial point of departure from health, causing this disturbance. I think in the matter of treatment Dr. N. Allen mentioned one important point, that we should extend sympathy to the patient. These patients are scolded too often; they need encouragement; and later on stimulate them with advice and counsel. No doubt in many cases the causation is induced by toxemia. I have found high-tension and inter-

rupted currents helpful in relieving many cases from intestinal or stomach and gastric pains, which I relieve by application of these currents. Have the positive electrode on the anterior, the negative upon the spine, and direction of current from one side to another. The static breeze has been helpful in many cases. The high frequency current has been of some benefit to relieve pain, headache in a few cases, but have not had sufficient experience with this current to speak strongly. They say that this disease affects only the wealthy, idle class, or those in the active stress of business, but it seems to me there are many poor people in the working classes in the daily routine who cannot escape from it. In this connection I recently read a note concerning the training of two young women to go out into the homes to study the psychological condition of the families, and study the influences that pass from person to person where there is true friendship and also in regard to the occupations in the home, of which, very likely, we will see further reports.

Dr. Fuller:—I confess I came here principally to hear Dr. White's paper. The experience I have had in treating neurasthenia by electricity is not sufficiently definite in value to present here. I can agree with Dr. Morse in saying a correct diagnosis is important before treating uterine fibroids, but it is equally important that the correct diagnosis is made of neurasthenia before we attempt to treat it by electricity. This brings out the much discussed question as to what neurasthenia is, and I find that the haziness about that subject is as great as among the laity. It is a very indefinite thing. I have always felt that there is a condition of nervous exhaustion which is practically an entity which can be separated from the cases of hypochondria, hysteria, and other mental diseases, including the obsessions and force which are so common which may be connected with neurasthenic conditions, and so the organic basis for neurasthenia, if it can be found, is the trouble and not neurasthenia. I think we should call the trouble by its own name and not neurasthenia. I think intestinal indigestion may be the prime cause which needs the treatment rather than any nervous exhaustion. The fact that so much is being done from a psychological standpoint I think is of sufficient proof that we know nothing about the really fundamental cause. It may be organic, but we do not know the nature of it as yet. It may be purely psychological, and we have many evidences that when these causes are removed the patient gets well. And because of the various modalities used in neurasthenia that are successful, it seems to me this is also sufficient proof that the actual effect of the electric current perhaps has little to do with the cure of the patient. If it were any one line of treatment by electricity that helped, we should feel more positive of it, but various patients need

various modalities, so it seems to me the argument must be made that the suggestion is, after all, a powerful factor. One of the speakers spoke of the improvement by passing the galvanic current through the body, though there might be little change; with these cases it seems to me the encouragement that something radical is being done changes the whole mental atmosphere, so it is my experience that in cases of neurasthenia it is the helpful suggestion that the electric current enforces. Though my experience is not large enough to make this as a positive statement. There is much that might be said on the subject.

Dr. McIntosh:—When we discuss a subject like this with so great a variety of causes and symptoms, we are reminded of the old Latin god who, when captured, would change his form so many times that he finally succeeded in escaping his captor. This subject is so dissimilar from the one Dr. Morse wrote of, and the causes of the disease so evanescent, that we are justified in suggesting a good many ways of curing the disease. I noticed one omission was made: that is, hydrophobia. You may never have considered that this has caused neurasthenia. I use the word hydrophobia in its strict sense, meaning fear of water, and we find many subjects are women who have been constipated for many years, and if they will drink water in many cases we remove the cause of a good many cases of neurasthenia. Another that has already been alluded to as a cause, toxemia. I think there is also another very important cause of neurasthenia; that is, overwork—the pressure of overwork and the nerve wear coming from doing too much and too fast; it is of great importance. A person, working up to the point of fatigue, and who neglects fatigue, sooner or later becomes a victim of neurasthenia, as fatigue is a tangible signal thrown out by nature to stop work. If fatigue is unnoticed week after week in the work of the professional man, he unavoidably comes to the experience of a patient who has nervous exhaustion. It is sufficient to say in a case like this the patient has disregarded the signals, has become worn out, and that is neurasthenia—in its strict sense, nerve exhaustion,—and in order to recover there is no modality to bring the patient back to normal in a very short time. The patient should be warned that his recovery will be only after a long period. The modalities that we use have this advantage, that we engage the mind of the patient in the pursuit of health, which is of great service. Again comes the question as to how much advantage comes of the suggestion. It is a very important, wide, and interesting side of therapeutics; if the patient comes under the influence of a physician of sympathetic temper, and agreeable manner, and continues in the atmosphere of encouragement for a long time, he will get well independent of the modes of treatment. I am in sympathy to *that* extent with the suggestion therapeutics.

Dr. Pitcher:—Dr. Fuller's remarks were very interesting and instructive, but he made one statement, that he thought that possibly the improvement in some cases was due to the fact that the patient was aware that something was being done. The suggestion amounts to a great deal, but in the treatment of the fibroid I think it has nothing to do with the case, as it is a mechanical form of treatment. I do not think the suggestion has anything to do with it, but in neurasthenia a great deal can be done in the way of suggestion. The patient receives more benefit from the electrical treatment than from any other, if correctly applied. It requires some degree of understanding as to the cause. There is always a condition of mal-nutrition, and there is no method that will help establish nutrition as well as electrical treatment. I think it makes much difference what method; we should study the patient until we discover the method most beneficial. Someone said they seem to improve under most any method, but it is due to the different vibrations of the different methods. One needs rapid vibration, but it all depends on the patient's condition. The paper was of a very high class.

Dr. Bridgman:—I want to ask a question suggested by a conversation I had with a prominent physician. We receive great help by the stimulation of spinal centers. A month ago this physician spoke of the great help he had received in this class of cases by the x-ray for stimulation for four and five minutes only, securing simply a stimulating effect. Have any of the members of the society had experience on this line? In regard to getting different effects from different modalities, it is possible that this is not true. The high frequency used with auto-condensation, high saturation, will improve. I have used this in a number of cases, and the results have been marked. I wondered whether the constant current high tension will not in a certain extent produce results as well as auto-condensation.

Dr. Abbott:—Dr. White suggested treating some cases with the blue light. I would like to know whether a high candle-power with a screen would have the same effect as the blue or violet ray without the screen. I have great faith in the violet ray. I had one case so marvelous that I will not go back on it. I believe if you have a case of neurasthenia caused by auto-intoxication that the high frequency will do more than any other, as it increases elimination. Elimination can be doubled in twenty-four hours by this. If it is a case of auto-intoxication it should be of great benefit. Some sanitarium was making cures by feeding on water and getting rid of the waste. Their theory was "Clean out, clean up, and keep clean." I think there is much more light in light than we think for.

Dr. McFee:—I do not like the idea of allowing the subjects

of Christian Science, or Suggestion, such a prominent place. Suggestion is a valuable adjunct to our method, but I think we must allow a great deal for the results of the electrical modalities. As a general practitioner I have come into contact with many such cases, and know that many times when I resorted most entirely to the use of drugs I was driven to desperation to obtain relief, to say nothing of cure; I think we should be especially careful to try and obtain some source of the disease by making a careful examination of the cause, and find out some definite point of attack, and I think in those cases where it is obscure in a way, by using electricity in many of those cases, suggestion plays an equally important part in our results, but where we have been careful and have succeeded in getting at some cause of the trouble and then selected a modality which we think best to meet the condition, we can look for good and satisfactory results.

Dr. Fuller:—I would like to correct the impression I gave in regard to suggestion. I do believe that various methods and modes should be employed, and that electricity is a very important one, but I do think, from experience, that suggestion is certainly often exceedingly important.

Dr. Davis, president:—I believe the patient should have the absolute sympathy of the physician. Call it suggestion, or what you will, but you will never cure a genuine case by suggestion. I believe that the average neurologist does more harm than good by telling the patient there is nothing the matter, and giving no sympathy. He has the idea that there is nothing the matter with the patient, but that it is all imaginary. The patient wanders from one physician to another, and finally gets well. One told me when I was the worst that he had had it for seven years and finally got well by holding on to the belief that he would get well; of course it was very discouraging to me to hear that he had had it for seven years. Inspire confidence in the patient; call it suggestion or anything else, but inspire confidence by sympathy. I do not believe in this nonsense; if we were to become Christian Scientists, or follow the New Thought, we should pull down our signs as scientific medical men. I do not believe we should, in our meetings, advocate the idea that it is suggestion and not our modalities or scientific treatment that produce the results. I hope the discussion of the papers in the future will not take this trend.

Dr. Gray:—Our discussions may be limited to electrotherapy when here, and perhaps a little too much of other things may creep in, but I do not think we could narrow ourselves to such an extent that we would lay undue prominence in the cure of any disease we may be called upon to treat. I do believe in holding the discussion down to the discussion of electricity and mechanical modalities, but certainly it seems to me in the

doing of that they should be given their true value, and not emphasized to the extent of giving undue prominence to them and influencing someone not understanding the modalities sufficiently well to think he has a panacea for every case of neurasthenia or fibroid disease that may come up.

Dr. White:—In my paper I spoke of winning the confidence of the patient, and not suggestion. It was treatment with electricity. Getting the confidence of the patient and watching the various symptoms, treating these symptoms. The idea of the blue light seems to be coming up, but with the blue screen we get especially a sedative effect, which we cannot get without the screen. In cases of insomnia the blue screen has that effect. Also vibration in the way I spoke of. The mental side I try to cover and pay strict attention to each symptom the patient speaks of; if you do not they will soon go to some other physician. The same proves true in the encouragement of the patient; they should be thoroughly encouraged. They will have their down days, and you will have to tell them in the first place that they will have to expect this. They always have their down days in every disease. Dr. Fuller spoke of the psychological forces that no doubt come in, and Dr. McIntosh spoke of the amount of overwork. It is not so much the overwork as the mental worry in business to make both ends meet from a financial point of view, that causes the breaking down of the nervous system. The idea of suggestion is given too prominent a part in the treatment of nervous diseases, especially in neurasthenia; the patient's nervous system is shattered and it is not enough to simply tell them there is nothing the matter. It is true that by giving up their occupation and taking a vacation, change of scene, etc., gives them a new line of thought that enables the system to re-assert itself. When this cannot be done, electrical treatment is by far the best method. They do not want drugs.



CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.,

Attending Surgeon, American Oncologic Hospital, Philadelphia.

(Continued from page 254.)

Insulation of Electrodes.—All active electrodes employed within cavities should have those portions of their surfaces which are intended to be non-active coated with an insulating material. This confines the whole effect to the spot designed to be destructively sterilized and protects non-diseased surfaces from useless and painful erosion. The ability to thus carry the action to any spot desired within a cavity, or, indeed, beneath any tissue safely penetrable by an electrode, is one of the chief advantages of the cataphoric method. This insulation is best accomplished in all electrodes not injured by heat by the employment of sealing-wax, a non-conducting material when free from metal coloring, but particularly in the instruments under consideration, as the act of properly coating the heated shank or non-active parts with hot wax not only secures perfect insulation but perfect asepsis also. When so prepared an instrument capable of use more than once is rendered perfectly fresh and new for a second application. This aseptic coating is, moreover, more convenient in practice than tube coverings or other methods of permanent insulation, as it presents no shoulder to catch in the tissues, the melted wax shading off in thickness at this point.

Black sealing wax (Dennison's No. 4 Black Express wax being an excellent variety) presents a seemly appearance, and is readily obtained at most stationery stores in convenient and inexpensive sticks when procured in pound lots.

To apply the wax, heat the electrode over the flame of a Bunsen burner or alcohol lamp—very gently if a minor electrode is to be coated, as zinc readily burns—and when it is hot, melt the end of the stick of wax in the flame and bring the surfaces together: a small portion of hot wax will adhere to the instrument. Apply other portions similarly to various surfaces and edges, and gently reheat the electrode until the coating is even, smooth, and complete. It is often necessary

to retouch the shank of the instrument in order to cover the sharp edges which the hot wax is liable to leave. A little practice soon leads to expertness, and one can readily coat a long and slender instrument, such as required in the nostril, for instance, with great ease.

An instrument capable of being used more than once requires a fresh insulation, which also ascepticizes it before being used on a second case. All necessary changes in curve should be given the electrode before insulation.

Amalgamation.—The amalgamation of an electrode is the union of metallic mercury with it at its active surface. The mercury unites with the metal to some distance beneath the surface, and as this renders the zinc quite brittle, *the electrode should not be amalgamated until it has been curved and insulated and the patient is ready for the operation.* Metallic mercury unites with a bright, clean zinc surface as soon as the latter is dipped into it. As the average electrode tip is slightly tarnished by oxidation, however, it is most convenient to dip it into a dilute solution (25 to 50 per cent.) of sulphuric acid. If it is then dipped into the mercury the maximum amount of the latter will adhere to it, particularly if alternatively dipped into dilute acid, mercury, plain water, and into mercury again; ending up with a final dipping into water to remove any remaining acid.

A necessary adjunct to the operating table will therefore be a glass tray on which are placed three glass receptacles, containing, respectively, dilute sulphuric acid, metallic mercury, and water. For the smaller electrodes and the tips of the internal electrodes ordinary medicine glasses make excellent containers of these materials. When a long breast instrument is to be amalgamated slender vessels about 10 centimeters high, with bases to keep them upright, such as are used with urinometers, are most convenient.

Arrangement of Portable Apparatus for Major Operation.—In a major operation with portable apparatus the battery boxes, containing from 30 to 60 commercial dry cells, are connected to the controller as shown in Fig. 17. The batteries being properly connected up, the meter is put in circuit by connecting its + post with the P treatment post of the controller.

The dispersing pad is now connected by its wire with the

N treatment post of the controller and the active electrodes with the free binding post of the meter.

In using this portable apparatus with the 110 volt direct current the polarity of the wires attached to the plug is ascer-

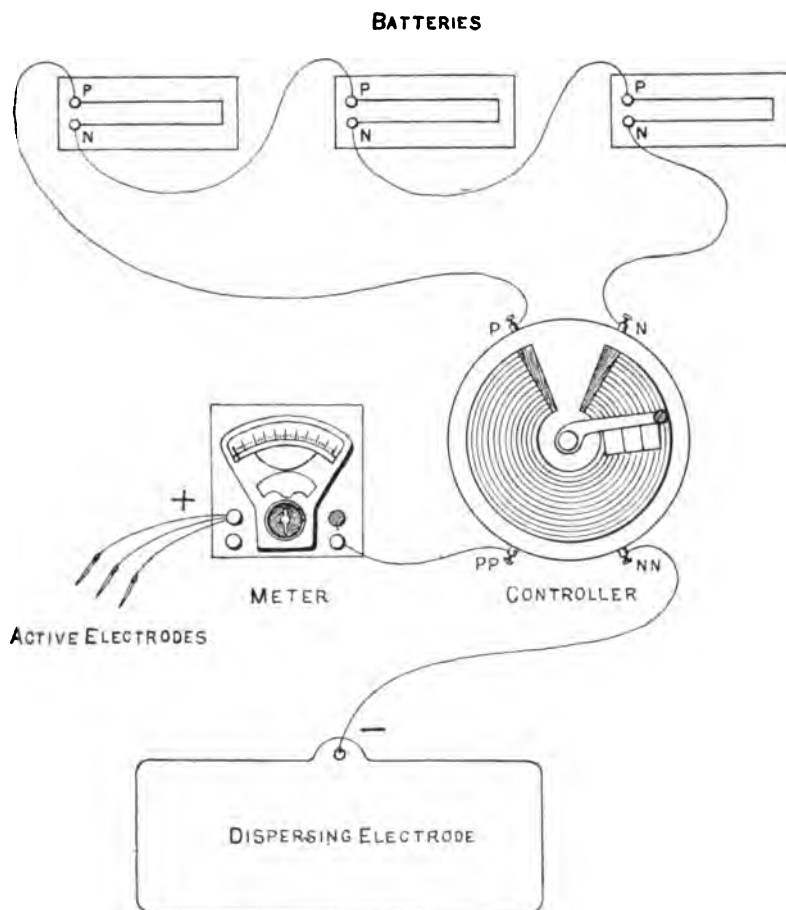


Fig. 17.—Diagram of arrangement of portable apparatus for monopolar cataphoric operation.

tained as described above, and the proper wires attached to the P and N inlet posts of the controller, the remaining connections being made as just described.

(To be Continued.)

Editorial.

THE VALUE OF MECHANICAL VIBRATION AS A DIAGNOSTIC MEASURE.

THOSE who have become familiar with the employment of the modern instruments employed in therapeutic vibration, particularly those who have employed them for spinal vibration in connection with an observance of the localization of centers with reference to peripheral connections, have become impressed with the value of vibration as an aid in diagnosis.

Areas or points of spinal tenderness are found in spasmodic asthma in the lower cervical region on the right side, and in some cases another area immediately below the clavicle on the left side. The fact that mechanical vibration applied daily to these regions is capable of relieving many cases of spasmodic asthma, indicates the location of the lesion as probably either in the cervical ganglia, or posterior nerve roots of the spinal cervical nerves.

A congested liver may always be suspected when pain is elicited by vibration over the upper and middle dorsal region on the right side, the diagnosis of which will be confirmed by vibration over the region of the liver anteriorly.

In pelvic congestions, tenderness in the lower dorsal and lumbar regions will generally be marked. Whenever areas of tenderness with or without corresponding muscular contractions are present, it may or will be referable to some viscus, to a vertebral arthritis, or a muscular affection in the region associated with the corresponding intervertebral tenderness, which may be differentially determined by examination with the vibrator anteriorly of a suspected viscus, by movement of the vertebral articulation, or by vibrating above and below or latterly over the corresponding muscles.

Examination anteriorly over the solar plexus and abdominal glands employing general vibration, elicits regions of tenderness with equal or greater thoroughness than manual palpation as of the liver and spleen. Superficial and deep vibration applied over the whole abdomen without discovering tenderness, will exclude the presence of congestion effectively, and in one-half the time and with greater thoroughness than

by manual palpation; but will require for manual examination the localization and measurement of tumors, and determination of varying degrees of hardness of affected tissues or organs. Mechanical vibration applied interruptedly and with varying degrees of pressure over the sacro-sciatic notch, over the emergence of the lesser sciatic, and along the course of the greater nerve trunks of the limbs, will map out points of tenderness or their absence which will differentially indicate the presence or absence of neuritis or muscular contractions in a most thorough and scientific manner.

Tenderness over both sciatics at or near the notch is a most certain evidence of inter-pelvic pressure due to internal uterine misplacements or the presence of tumors or other congestive processes in the pelvic cavity.

It will be readily appreciated from the foregoing that with the grosser examinations it is possible to determine the location of inflammatory processes and tender nerve points of both the sympathetic and cerebro-spinal systems. In this connection it may be added that the significance of such examination as a routine practice is such that, by bringing into prominence the findings of every case, conditions which might otherwise be neglected are brought into due prominence. If no other use were made of the vibrator than as a diagnostic measure, and its other fields of utility are large, it would still be indispensable as a ready and scientific aid to diagnosis.

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TO THE MEMBERS OF THE AMERICAN ELECTROTHERAPEUTIC ASSOCIATION.

The next annual meeting of the Association will be held in New York City, during the third week in September, and if we are to continue to advance with the best of the scientific world, we must begin early and work late.

The Boston meeting was a notable one, but we must make the next convention the greatest in the history of the American Electro-Therapeutic Association; and with New York City, the great meeting-place of the country, as the next place of meeting, we can easily do it if each member will do his share. We have all been hard at work since last September and each member has acquired some knowledge, which we

want to have brought out in our next meeting. We not only desire that every member be present, at the next convention, but that he report his personal experience. The Association is for mutual education, and every member should contribute for the good and welfare of the Association.

Let everyone contribute something, read a paper, or take part in the discussions. Begin now and prepare a paper on some subject most familiar to him; on his most successful modality. A member may have had a succession of cases which have been treated more or less successfully, or may have made a special study of some particular disease; if so, give the Association the results of such experience.

One cannot practice electro-therapeutics for any length of time without doing some original thinking, discovering some fact, or making some improvement upon an old method. "Do not hide your light under a bushel," but give the Association the benefit of what you know. We need brief papers, and to the point, for our next meeting. Bear in mind that every member who intends to keep abreast of the times and become familiar with the best in physical therapeutics, cannot afford to miss the New York meeting.

HERBERT F. PITCHER, M.D., President.

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EDITORIAL NOTES.

The Thirty-ninth Annual Meeting of the American Medical Editors' Association will be held at the Auditorium Hotel, Chicago, on May 30th and June 1st. The usual banquet will take place at the Hotel on the evening of June 1st. The following preliminary programme has been announced.

"General Business Ethics." By Dr. Kenneth W. Millican (Journal A. M. A.), Chicago, Ill.

"The Application of Journalistic Principles and Methods to Medical Journalism." By Dr. T. G. Atkinson (Medical Standard), Chicago, Ill.

"Scientific Editorial Matter." By Dr. T. D. Crothers (Quarterly Journal of Inebriety), Hartford, Conn.

"Editorial Individuality." By Dr. Geo. Thos. Palmer (Chicago Clinic and Pure Water Journal), Springfield, Ill.

"The Non-Scientific, or Utilitarian Editorial." By Dr. Mary S. Johnstone (Woman's Medical Journal), Chicago, Ill.

"The Medical Journal from the Standpoint of an Outsider." By Dr. Geo. F. Butler (recently an insider), Chicago, Ill.

"The Modern Era of Medical Journalism." By Dr. H. C. Marcy (a veteran), of Boston, Mass.

"The Function of the State Medical Association Journal." By Dr. S. L. Jepson (West Virginia Medical Journal), Wheeling, W. Va.

"Office of the Quarterly Medical Journal." By Dr. H. N. Wurdeman (Ophthalmology), Milwaukee, Wis.

"What Medical Journals Can Do to Reform Medico-Legal Inquiries." By Dr. R. B. H. Gradwold (The Medical Brief), St. Louis.

"Non-Sectarianism in Medical Journalism." By Hills Cole (North American Journal of Homeopathy), New York, N. Y.

"The Agent, the Advertiser, and the Publisher." By Dr. Jos. MacDonald, Jr. (American Journal of Surgery), New York, N. Y.

"The Relation of the Medical Journal to the Medical Profession and Advertisers Respectively." By Wm. Benham Snow (Advanced Therapeutics, etc.), New York, N. Y.

"The Production of a Spotless Medical Journal." By Dr. J. Burroughs (Gaillard's Medical Journal), Asheville, N. C.

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—The meeting of the American Protologic Society will be held at Palmer House, Chicago, Ill., on the 1st and 2d of June, 1908. An interesting programme has been prepared.

—We are pleased to announce that Albright's Practitioner and the Journal of Electro-Therapeutics, previously published at Lima, Ohio, have been consolidated and will be published as Albright's Practitioner, with the electro-therapeutic department edited by Dr. Bennett, former editor of the Journal of Electro-Therapeutics.

Progress in Physical Therapeutics.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Some Potent Therapeutic Influences, Present and Prospective.

In a recent editorial in the New York Medical Journal the following interesting observations on the above subjects are noted: "It cannot have escaped the observation of any one who may have turned his attention to the subject that the treatment of disease, or perhaps it is more correct to say the method of treatment of many diseases, is undergoing a process of change which is more or less revolutionary. The era of polypharmacy with its multitude of drugs, the use of many of which is often in the highest degree empirical and unsatisfactory, is passing away. Of course the time is far distant, and it may never come, when drugs will be discarded, but it is evident that the utility of many of them as means for the possible cure of disease is less highly regarded than was formerly the case, and in many instances they have given place to one or another of the agencies which form the subject of the article.

"These agencies, which will constitute at least an important part of the therapeutic system of the future, rest upon as solid and substantial a basis of scientific fact as almost anything outside the realm of pure mathematics. . . . Hydrotherapy is a means of treatment for which the future is holding out great promises. Much has already been accomplished by it, especially during the past twenty-five years. Further study and elaboration will be sure to amplify its field of usefulness. One need only recall the valuable results which it has yielded in the treatment of typhoid, and other fevers, diseases of the heart, liver, and kidneys, and a great number of the eruptive diseases to realize the importance which already belongs to it. Lavish Nature has supplied us with water in almost unlimited quantity, and it is often combined with powerful substances for relieving sickness and disease. It cannot be doubted that in the near future we shall obtain much additional knowledge as to its practical applicability.

"Massage and muscular motion as means for the treatment of disease have a much greater range of usefulness than is ordinarily supposed. When we realize what has been accomplished by this agency in the past, the health and beauty and vigor which it brought to the ancients, especially the Greeks, we do not wonder at the enthusiasm of those who advocate its

systematic use. Muscular activity means quickened circulation, nervous energy, improved performance of function, enhanced metabolism, and general well-being. The Swedish and other forms of movements, gymnastic exercise, and various forms of rubbing and manipulation are too valuable to be discarded or disregarded, or left in the hands of the half-educated or the charlatan.

"Finally, we are now at the threshold of the great developments which are to come with the more complete understanding and more perfect adaptation of the physical forces, heat, light, and electricity. We have long been familiar with the useful results of moist heat by means of the simple or medicated hot bath, the Turkish bath, etc., but the scientific employment of dry heat is of recent date. It is remarkable that dry air may be used at a temperature of a hundred degrees or more beyond that which would be safe or useful with moist air. The relief of surgical shock and the cure of many chronic disorders which may be accomplished by dry heat are evidences which we already possess as to its great value. Equally astonishing are the results which are being accomplished by means of light. The Roentgen rays, the Finsen rays, and the emanations from radium are opening fields for investigation in practical therapy of which we have as yet but little conception.

"It is not improbable that we shall find equally beneficent results from the use of electricity. Though its therapeutic effects have thus far been limited and often disappointing, it is hardly possible that an agent which is so closely allied to nervous energy can be without great utility for the cure of disease. . . . What a vista is opened for the future by these remarkable agencies! Disease is an accompaniment of civilized life to a far greater degree than in more primitive social conditions, but the expanding and developing human intellect is gradually clearing the way for the removal to believe that this progress will continue."

Balneotherapy in Urinary Affections. By C. Posner, Berliner klinische Wochenschrift, June 26, 1905.

Among the points emphasized by Posner is the necessity for discriminating between salt-containing and salt-free waters in treatment of urinary affections. The action of salt in inducing edema has been amply demonstrated in the last few months. Chronic catarrh of the bladder and kidney pelvis seem to be best adapted for treatment with mineral waters. Chronic parenchymatous nephritis contraindicates them. Neuroses of the urinary and sexual apparatus are often favorably influenced by a course of treatment at a watering place.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

(Continued from page 281.)

CHAPTER IV.

SOURCES OF RADIANT ENERGY.

An incandescent lamp manufactured by the Victor Electric Co. is constructed with sockets for four lamps and provided with individual reflectors, so placed as to throw the light in practically parallel beams of light. The lamps that are employed are of various candle power aggregating from 200 to 400 candle power for the four. One of the lamps from this group is provided with a handle and may be removed for the



Fig. 11.—Small Victor Lamp.



Fig. 11.—Small Hand Screen.

purpose of use as a hand lamp, similar to Fig 11, for local applications. These lamps are also provided with small glass screens of orange, blue, and red which may be adjusted over the front of the small shield, whereby local administrations may be made of these various colors if desirable.

There are numerous other incandescent lamps manufactured of practically the same design as the small "midget" and hand lamps of the Victor and Spear-Marshall, and Frank S. Betz Companies, which are practicable for the treatment of local

lesions in which only small areas are to be treated. When requiring body or general administrations, however, too much time is required for the administration to make the small lamps practical.

Another type of lamp, the *Göerl* lamp, in which the radiations are produced by sparking between balls placed in circuit, usually in the form of a triangle, so that sparks will pass steadily between the balls during the flow of the current, has been modified by the Victor Electric Company; and the so-called Piffard lamp, manufactured by Waite & Bartlett. A type of this lamp for use with the static machine is also manufactured by the Van Houten & Ten Broeck Company. These lamps, by passing a considerable current through the circuit, produce a radiation that is fairly rich in ultra-violet frequencies, and may be used in lieu of the more expensive lamps for making application to certain superficial lupus patches, etc. As has been said before, these lamps furnishing the ultra-violet discharges are generally less efficient in their action than the Roentgen Ray, hence their therapeutic value is not of much importance.

The mercury vapor lamp, invented by Cooper Hewitt, and one of the most recent sources of artificial light, is peculiarly rich in the ultra-violet end of the spectrum. The fact, however, that the light produced is within a cylindrical glass tube, does not permit the radiation of the higher frequencies—the ultra-violet—and is deficient in heat radiations.

The Uviol lamp, Fig. 12, manufactured in Germany, is a mercury vapor lamp, a modification of the Cooper Hewitt lamp. The manufacturers have laid claim to the fact that the quality of the glass employed permits the emanation of radiations rich in ultra-violet, and some of the therapeutic results would seem to justify the claims. However, careful test made by the writer, in which it was endeavored to pass the ultra-violet rays through the glass tube, failed to produce the characteristic green fluorescence of willemite or the characteristic fluorescence upon a platino-barium-cyanide screen in a darkened room.

Light bath cabinets are properly of six types; the first two with reference to the position of the patient during the light bath whether (1) sitting, or (2) reclining (upright or horizontal), and two with reference to the character of light em-

ployed, (3) arc or mixed baths, and (4) the distinctly incandescent bath cabinet, (5) a local cluster of lamps for treating joints or localized inflammatory areas, and (6) another type in which a high power incandescent lamp is applied over a long

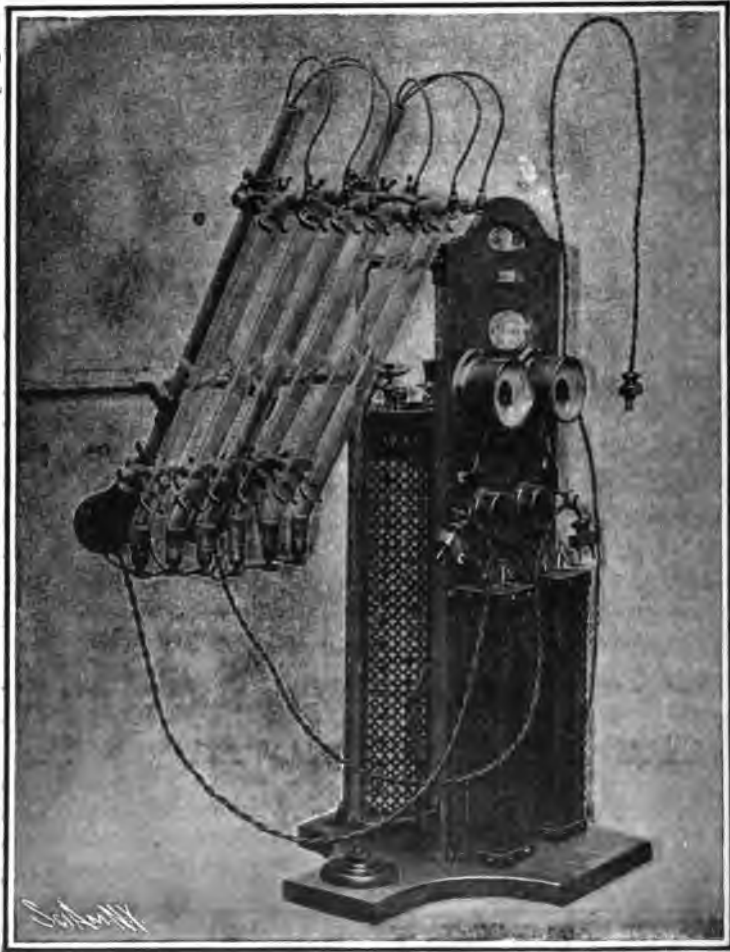


Fig. 12.—The Uviol Lamp.

narrow box cabinet with glass window. These may be still further varied by the employment of varying colors in the baths; for which, however, there seems to be very little indication; because, on general principles, the employment of white

light is in most cases to be preferred to any one of the spectral colors.

The types of construction of light bath cabinets are based upon two principles; (1), the position of the lights and reflectors in such a manner that the radiant energy will be directed towards the body of the patient; and (2), that the capacity of the cabinet shall be relative to the number of lamps in the space, or the degree of accumulated heat that it is desirable to administer to the patient; for as will be readily appreciated from the first lighting of the bath cabinet when closed, the temperature within the cabinet increases. The question, therefore, for consideration is, shall the cabinet be large enough to permit radiant light and heat to produce the effects of radiant energy upon the patient, or be constructed smaller in proportion to the number of lights installed in order that the heat accumulation in the smaller air space shall raise the temperature of the bath, that the mixed effects of radiant light and heat and accumulated convective heat shall permit the employment of a high temperature within the cabinet. As a matter of fact, the general-purpose bath could not combine these two qualities except some additional means be provided for increasing the heat within the bath cabinet, which may be readily accomplished by making provision within the larger cabinet for placing a number of large sized blue glass bulbs, which radiate a larger percentage of heat than the plain glass bulbs of equal candle power, when owing to the conversion of the luminous rays are converted into heat by their absorption in the glass walls of the colored bulb, which effect will be readily appreciated by placing a finger against a colorless glass bulb and then against a colored one.

In the construction of a light bath cabinet, several features are to be considered. (1) The cabinet construction should be of good workmanship if not to be lined with metal sheeting, which latter plan is generally objected to by the fire-underwriters, owing to the possibility of short circuits through the metal lining of the cabinet. This, however, may be obviated by the employment of wood pulp sheeting or smooth surfaced asbestos sheets, placed in position and coated with white enamel paint. (2) The interior shape of the cabinet should be such as to throw the light generally towards the center of the cabinet—the space to be occupied by the patient. The

shape of the cabinet in the interior should therefore, particularly the upright type, be in the form of a hexagon or an octagon. The character of the reflecting surfaces should be

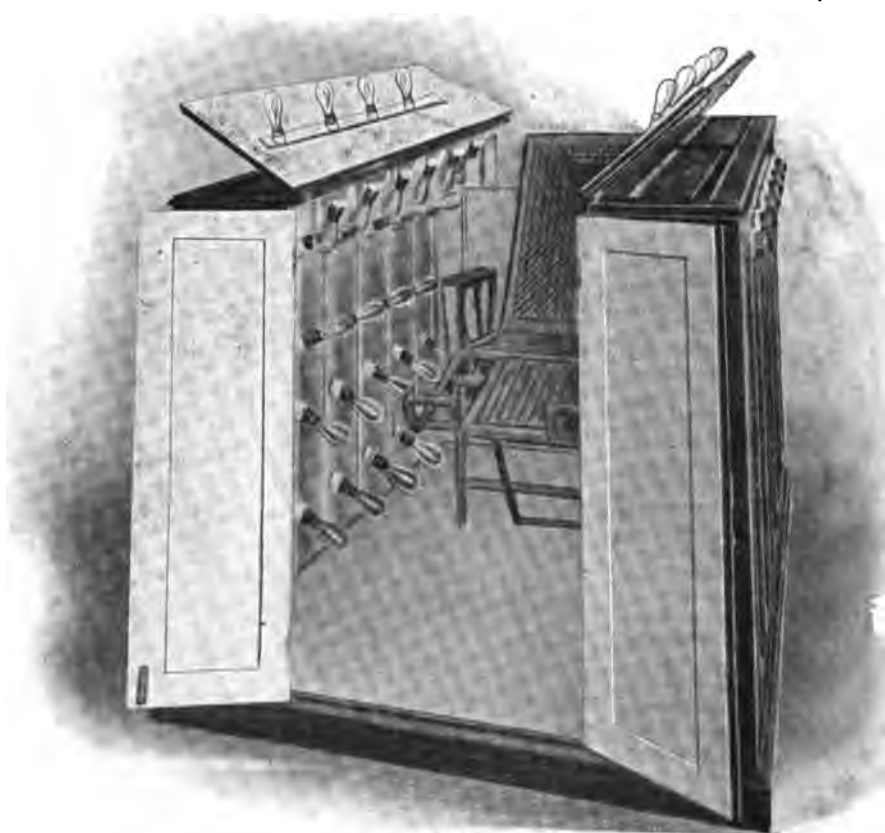


Fig. 13.—Author's Bath Cabinet.

preferably of white enamel paint or white porcelain, reflecting mirrors adding very little of the real utility to the cabinet. Parabolic reflectors of polished metal in position back of each of the incandescent or arc lamps, if properly focused will aid in directing the radiations towards the position of the patient in the cabinet. (3) The size of the cabinet should be

such that the individual lamps will be located at about 14 to 18 inches from the space to be occupied by the patient, in order that the patient may not be apt to come against the sharp points of the incandescent lamps, which may, however, be placed at varying angles, preferably at an angle of 45° , as the greater luminosity is projected from this angle with the ordinary incandescent bulbs; whereas with specially constructed bulbs, such as are used with the smaller hand-treatment lamps, provided with parabolic reflectors, a larger amount of light is projected in the line of the long axis of the lamp.

In hospitals and offices where invalids of all types are to be treated a *reclining bath* possesses an advantage if high temperatures are required, particularly in patients having impaired cardiac force, because with the patient reclining there will be no danger of syncope during the administration; whereas in the upright cabinet the dangers of this sort will preclude the use of the light bath with a large class of patients for which its use is indicated. For the family light bath cabinet, however, in most instances, the *upright cabinet* would fulfill the purpose.

The *incandescent bath* possesses the same advantage for therapeutic administration over the arc light that the large incandescent lamp does over the high candle power arc light, as previously stated; because while it is rich in the penetrating luminous rays and heat radiations, it is devoid of the irritating effects of the higher frequencies of the arc light, particularly the ultra-violet; and also emanations from the arc of the nitrous acid, the fumes of which are very irritating as they escape from the cabinet, or when the cabinet is opened—producing disagreeable irritation to the lungs and fauces of the patient when the fumes are inhaled.

If the *arc light* is possessed of any advantage in therapeutics over the incandescent for the treatment of any class of cases, it resides in the fact that the reflex effect from the irritation of the skin by the ultra-violet radiations, or that the action of these radiations upon the skin, possess some particular advantage in certain skin conditions. For the administration of radiant light and heat for general tonic and metabolic effects, the radiations having the higher frequencies filtered out are in all instances to be preferred.

Special types of light bath cabinets have been constructed by various manufacturers to meet the indications for the treatment of most conditions.

The writer's bath cabinet shown in Fig. 13, is constructed by E. B. Meyrowitz of New York and was designed to treat patients in a recumbent position. The bath is provided with 60 sixteen candle power incandescent lamps, and with an open work chair upon which the patient reclines. A door is placed at the one end, and folding doors over the top, with an opening for the protrusion of the patient's head at the opposite end.

(*To be Continued.*)

SOCIETY MEETINGS.

THE NINETEENTH REGULAR MEETING OF THE NEW ENGLAND ELECTRO-THERAPEUTIC AS- SOCIATION.

*Held on the Evening of March 13, 1908, in the Auditorium of
the Edison Building, 39 Boylston Street.*

The meeting was called to order by the new president, Frank Albert Davis, M.D., at 8 o'clock P.M. There were forty-seven members and seven visitors present.

The record of the annual meeting held at the Hotel Buckminster, February 14, 1908, was read by the Secretary, and approved.

Report of Executive Council.—The Executive Council approved the bills of last meeting and bills presented by the secretary for printing and paper and postals, and also approved work done in the interest of the society by the new Secretary.

The Committee on Entertainment were reappointed. Dr. Pitcher expressed a wish to resign as chairman of this committee because of his present duties as President of the American Electro-Therapeutic Association, but his resignation was not accepted.

President Davis stated that, through the efforts of Dr. Harris and Mr. Money, the association has been given the use of this hall, by the Edison people, for an indefinite period, and he thought that the society owes great thanks to these two members for their active work in its behalf. This affords the society

one of the best meeting-places in the city, it being central, and saving expense. He also stated that, through the personal efforts of Dr. Harris, the notices of the meetings of this association will appear in the columns of the Boston Medical and Surgical Journal, which is another thing which will do the association no harm. He further stated that we have covered in the past two years pretty thoroughly in a general way electro-therapeutics, and it has seemed wise, the coming year to specialize a little more, especially in the use of electricity in special types of disease, and that we will make this the keynote of this year.

Dr. Allen suggested at the last meeting having a change in By-Laws and Constitution, whereby each new member should be obliged to pay membership fee at time of application. Dr. Harris has patterned after the American in style of membership blanks, and they are here for any members who wish to use them.

Another thing the Secretary has done is to have some official paper printed with the name of the society and officers; for any business matters about which the officers may have any correspondence. He has also had postal cards printed which will have a set form announcing the place of meeting, with blank spaces left for announcing date and subjects, which any member can have (one or more) to send to any professional friends at any time to invite them to the meetings. They are to be had from the Secretary.

A motion was made by Dr. McFee and seconded by Dr. Allen, making the Journal of Advanced Therapeutics the medium through which our papers would be published. The motion was put to a vote and carried.

Dr. Howes made a motion that a committee of three be appointed to make some changes in the Constitution and By-Laws and report at the May meeting. Dr. White added that these corrections be made in writing. The motion was seconded by Dr. Thompson and put to a vote and carried. The President appointed Drs. Morse, Howes, and White.

A paper was then read by Dr. F. B. Granger on "The Electrical Treatment of Certain Functional Neuroses." The paper was handled in a scientific as well as a practical way. It was made plain the duty of every physician in carefully searching into the history of each case, in carefully studying each

symptom, and trying to arrive at definite conclusions. The causes were divided into groups and the writer laid special stress on this grouping before treatment was begun, because in one group exercise was needed, and in another rest was needed. The treatment by electricity was carefully described and based on strictly scientific lines. The paper showed that the reader had given much thought to his subject and laid out a plan of treatment. He showed the great value of electric modalities in the treatment of these cases. The paper brought out some very fine discussions and many valuable suggestions were made, all profiting thereby.

Dr. McIntosh suggested that after adjournment the President should hold an informal reception, so as to become better acquainted with all the members, which suggestion met with approval.

Dr. McFee made a motion that in expression of appreciation for securing this hall the society extend a vote of thanks to Dr. Harris and Mr. Money. Motion seconded and carried.

Motion made to adjourn; seconded and carried.

After adjournment it was suggested that there be a place selected where members could meet and eat, being reasonably certain of meeting other members, and it was suggested that the Secretary be appointed to look up such a place.

SAMUEL J. HARRIS, M.D., Secretary.

THE TWENTIETH REGULAR MEETING OF THE NEW ENGLAND ELECTRO-THERAPEUTIC AS- SOCIATION.

*Held in the Auditorium, Edison Building, 39 Boylston Street,
Boston, Mass., Friday, April 10, 1908.*

President Frank A. Davis in the chair.

Meeting was called to order, and reading of the records of the last meeting by the Secretary, which were approved.

A letter was read from Dr. Snow, written to the President, Dr. Davis.

The Secretary was instructed to keep all communications on file for future reference.

At the suggestion of Dr. Morse, Dr. Pitcher made a motion that the sum of twenty-five dollars be given to Dr. Reeves,

our former secretary, for his valuable services to the society. Motion was seconded by Dr. White, and carried, and the treasurer was instructed to send Dr. Reeves the sum.

The President stated that he and the Secretary in getting up the new programme had followed out the suggestion of several members; also the suggestion that was put before the society, that members having clinical cases would further the interests of the society by showing them at the meetings. It seemed wise to incorporate that as part of the programme. Also the suggestion of Dr. Thompson, of Fall River, that new appliances, other than manufacturers' apparatus, be brought before the society. Any members having such cases or appliances would add to the interest of the society by bringing them in, and we want them to feel free to do so.

A paper was then read entitled "The Treatment by Electricity of Uterine Fibroids and Allied Conditions," by our ex-president, Dr. Fred H. Morse. The paper was a highly instructive one and showed the value of electricity in fibroids, especially in inoperable fibroids of the hemorrhagic type, as well as in small fibroids. The discussions brought out many valuable points and all profited from the large experience of the reader.

A paper entitled "Neurasthenia and Occupation Neuroses, their Treatment by Electricity," was read by Dr. Walter H. White. This paper showed the great care necessary in handling these cases, the importance of correct diagnosis, the importance of gaining the confidence of the patient and giving them encouragement, and the great value of electricity in the treatment of these cases acting not in any suggestive way, but on strictly a scientific basis. The wide experience of the reader proved that electricity, scientifically applied in these cases, is one of the greatest therapeutic measures we have for combating this dreaded affection.

Papers were enthusiastically received and were well discussed, bringing out many valuable suggestions.

The President stated that the discussions had been very interesting and the papers most excellent. He called the attention of the members to the new programme.

A motion to adjourn was made, seconded, and meeting adjourned after a very pleasant and highly instructive evening.

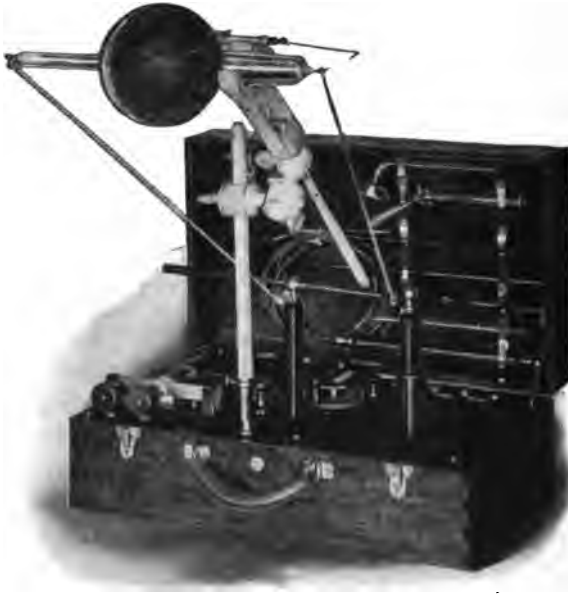
SAMUEL J. HARRIS, M.D., Secretary.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

VICTOR PORTABLE X-RAY AND HIGH-FREQUENCY OUTFIT.

This latest addition to the well-known Victor line is perhaps the best and most practical *portable x-ray outfit* so far produced. It is built on the Tesla plan of transformation, the



Portable X-Ray Coil.

energy being converted through a series of synchronous transformers or converters and effected so efficiently that approximately 96 per cent. of the energy passed into the apparatus is available at the main terminals for x-ray and treatment work.

Excellent radiographs can be taken with this portable outfit in exposures of from a few seconds, in the case of the extremities, to from three to six minutes for the chest and

pelvis. The fluoroscopic vision is fully equal to that obtained with the largest coils, and it is really a thoroughly practical outfit for the x-ray worker, although not intended to replace the large, heavy ampereage induction coil for rapid radiographic work.

In addition to its x-ray functions, the Victor outfit gives the operator command of *high-frequency currents* for treatment work in wide variety, as to voltage and frequency.

It is easy of manipulation, has no troublesome or expensive interrupter to contend with, and will cost the physician little or nothing for maintenance.

It should appeal to the experienced x-ray worker because of its portability, ease of manipulation, absence of interrupter, and because of its economy, both in current consumption and cost of maintenance. To the average physician with little or no experience in x-ray and high-frequency work, it is to be highly recommended because of the same reasons, and also from the fact that without any previous experience whatever he can learn to manipulate and operate one of these outfits in less than an hour—a thing that cannot be said of any other type of machine or coil so far offered to the profession for this class of work.

The Victor Company have compiled a very interesting little pamphlet on the Physics, Physiological Effects, and Therapeutic Indications of High-Frequency, High-Potential Currents, and they will be pleased to send it to any one interested in this field.

VICTOR PORTABLE VIBRATOR.

Although it is not possible to construct a vibrator within the space and weight limitations called for in a portable or hand vibrator, the Victor Company claim to have produced a little vibrator of this type capable of delivering a considerably greater amount of energy than has been the case with any other machines of this character.

The penetration is also greatly aided by the character of the stroke or vibration delivered. Instead of a centrifugal or rotary vibratory wave being imparted, the vibration delivered is calculated to send out waves in straight lines from the point of impact: thus, each succeeding wave aids its predecessor.

The penetration is sufficiently great so that it is felt throughout the entire trunk when application is made in the chest region.

A great improvement, and a point that is well worthy of mention, is the fact that a visible scale enables the operator to know at all times the degree of vibration which he is



Portable Vibrator.

administering. The manner of regulation admits of a very wide range, sufficient for all purposes.

The entire machine is constructed in the Victor factory, every part being given their usual careful attention, with the result that the physician is insured continuous and uninterrupted service.

This instrument is illustrated in the Victor Company's latest catalogue.

The Journal of Advanced Therapeutics

VOL. XXVI.

JULY, 1908.

No. 7.

ROENTGEN DERMATITIS: ITS PREVENTION AND TREATMENT.*

MIHRAN K. KASSABIAN, M.D.,

Director of the Roentgen Ray Laboratory of the Philadelphia Hospital,
Philadelphia, Pa.

I shall only review a few points on the dangers of the x-rays, their prevention and treatment. I will ask the members to discuss these questions and present new thoughts.

I am prompted to speak on this subject by the occurrence of so many deaths, the result (direct or indirect) of x-ray dermatitis. Among the martyrs to this cause, I can mention the names of Mr. Dally, Mrs. Fleischmann, Dr. Weigel, Dr. Fuchs, Dr. Blacker of London, Dr. Radiquet of Paris. The number of operators that have been disfigured, maimed, and injured would form a long list.

These, like myself, had been sufferers from this trouble; and as I have been relieved partially from the affection I thought it well to bring to your notice the methods which proved so useful to me in prevention and also in treatment.

Preventive methods for the patient. As to the preventive methods for the patient. For this purpose we may inclose the Crookes tube in an opaque shield, this may be of rubber which is impregnated with bismuth, or may be a box lined with a very thin sheet of lead, or a box painted with lead preparations. These devices will partially exclude the most dangerous rays that come out from the tube. Different sizes of diaphragms are attached to the opening in this opaque cover.

In radiographing for diagnostic purposes there is very little danger of dermatitis, as the time of exposure has been reduced from minutes to seconds; but for the sake of safety it is best, I believe, to protect the part of the patient that is not to be radiographed.

* Read before the American Electro-Therapeutic Association, at Boston, September 19, 1907.

The diseased area during the irradiation can be further protected from the non-penetrating rays by using a large sheet of aluminum (1-32 of an inch in thickness) grounded. I prefer the aluminum as a filter to the leather and recommend its use in treating the deep and superficial conditions. I have treated several patients three years, thrice weekly, continuously without any sign of dermatitis. Maraglione of Rome places diachylon plasters over the area to be irradiated, expecting the absorption of the less penetrating rays by it. Of course we must necessarily study the patient's susceptibility.

Protection of the operator. For his own protection, the operator should never hold his hand to test the intensity of the rays. The Crookes tube should be inclosed in an opaque shield, and the operator if possible should stay behind a lead screen or in a sentry box arrangement, and watch the fluorescence of the tube through the lead glass. He should never stay in the same room if possible, and must wear an opaque apron, gloves, and spectacles of lead glasses to protect the eyes. Always arrange your place in behind the anode, viz., the inactive hemisphere of the tube.

I believe that the method that I have been using for the last five years in the Philadelphia General Hospital and in my own consulting office is the best protective device, as shown by the improvement you notice in my hands. This device is as follows: While the patient is undergoing treatment or examination, the operator should be in a communicating room, where he can observe the fluorescence of the tube from a mirror suspended at a convenient angle from the ceiling. A wall, lined with half an inch thick of lead, will separate the tube and operator, the penetration of which can be tested by a photographic plate or electroscope. The current can be turned on and off and regulated by a rheostat in this room. When this method of treatment is used, it is not necessary for the operator to wear any other protecting devices.

Treatment of Roentgen ray dermatitis. In acute form, the slight erythema may disappear within a few days, but when the irritation is excessive and accompanied by intense itching, soothing remedies as zinc oxide ointment, compresses of ice, etc., may be used. The employment of carbolic acid, bichloride of mercury, and other antiseptics produce irritation. I

wish to record the case of a patient, whose stomach my assistant in the Philadelphia General Hospital examined with fluoroscope by giving him a bismuth meal. The exact time is not recorded, but so far as I can learn, about ten minutes. Two weeks after I saw the patient in the ward and he was suffering from an x-ray burn. The interne and attending physician did not know the cause of the burn, but they thought it was a form of eruption and were treating with dilute solution of carbolic acid; I notified the physician and told him that the patient was suffering from an acute form of x-ray dermatitis; the treatment was discontinued and we began to apply warm normal salt solution and compresses; the vesicles were opened and washed with sterile warm water several times a day.

A photograph was taken when the burn was in an acute stage and another was taken eight months after the treatment with normal salt solution, which shows the skin in a healthy condition.

The treatment of the *chronic form* is very tedious and often resists any well known remedies used for the ordinary burns.

The operator's hands are the most often affected parts. In spite of the fact that the operator may discontinue the exposure to the rays or protect himself, the acute condition becomes chronic and the destructive process keeps on continually. I have found that by immersing my hands into the hot water the intense itching is relieved. Once I used orthoform to lessen this itching; within two days my fingers were swollen. It had made my hands worse. When fissures occur in the knuckles, a ten per cent. solution of argyrol will hasten the healing. Continuous moist dressing macerates the tissues, often sterile gauze applied loose over the finger allows the air to enter, when evaporation takes place freely. Cold cream and lanolin will soften the skin and render it more pliable and should be applied after immersing the hand into the hot water.

Skin grafting over the fingers, ulcers and too much surgical meddling is often dangerous and in many instances has proved fatal. Warty excrescences may be filed down gently once a week, being careful not to cause any inflammation under the warts; a small piece of sand paper may be used.

At present, if operators take the precautions that I have enumerated above, they will not have any Roentgen dermatitis.

Discussion.

Dr. Brigham: I was very much interested in the Doctor's paper. I wish to say that I hardly coincide with his use of salt solution. I had one burn 15 1-2 inches long which healed inside of two weeks with salt solution. That put me on the track of experimenting with common salt. 2-11 of the common salt is decomposed, and if it is decomposed, what must it be decomposed into? It must be decomposed into sodium and chlorine. Sodium must unite with water and the tissues and set chlorine free. Would not sodium burn into water and burst into flame? What will be the action of sodium hydrate distributed throughout the tissue?

In speaking of the dangers of x-ray, there is one point I wanted to bring out. I have tried to find text-books that will give me some information on this subject. I was greatly interested until I came to one passage as follows: "A few words concerning the so called x-ray burns. The continued administration of the x-ray in one locality produces (due to its irritating influence) at first the dermatitis. If the treatments are unduly continued ulceration of the tissues may occur, but an x-ray burn need never to be considered serious. This statement is made because of the many bold announcements which have appeared concerning burns under x-ray exposures. Relatively the inflammatory reaction or dermatitis produced by the x-ray is harmless, and in most cases if the parts were not meddled with by the application of ordinary chemicals, especially carbolic acid in some form or other, which of itself may cause gangrene, nature would assert itself and make repairs." Neiswanger on Electric Therapeutical Practice, last edition.

Dr. Snow: I think that Dr. Neiswanger intended to be understood that with the use of proper caution and proper management, there need be no danger. I believe there is danger without the exercise of care. "The burnt child dreads the fire." Dr. Kassabian many of you have known and have seen him during the last few years. Since he has been taking good care of himself you will note the great change in his constitutional condition. He has not made rapid recovery from the conditions that had taken hold of his hand. There is no question in any-

body's mind that it is a foolish procedure for any man to expose himself unnecessarily to the x-ray.

In using it I go into my room and start my tube. I do not make great haste, lest my patient be unnecessarily alarmed. I have been working for a good many years in this way and have always taken the precaution of keeping away from the ray as much as was prudent, and like others who have taken the same precautions I have not suffered in the least. If I were in Dr. Kassabian's place I should be very careful. I would keep in the corner well shielded, as he does. . . . My routine plan is to start my ray, and either stand back a few feet from the anode end of the tube or go into another room. I have my patient in view, but do not go behind a shield. There are many of us who have been using the x-ray for ten years and yet have not been so very particular. We have had enough knowledge however from experience of others, and have exercised reasonable precaution in the use of the x-ray without suffering any ill effects. Dr. Kassabian has done absolutely no harm in making his precautions strenuous. We must be very careful if we are doing much x-ray work, particularly radiography. If we are using rays for treatment only, in most cases we only use a ray of low volume and less danger.

I believe that as a prophylactic measure it has been fully demonstrated in the experiments which were made by myself four years since, when I showed that radiant light and heat offset the effect of the ray. Dr. Titus' experiments confirmed it. He was able to restore vital energy to the cells that had been rendered inert in hens' eggs and seeds.

Dr. Brockbank: Suggesting the local application,—a solution of common Epsom salt is one of the greatest things to relieve local irritation and in many cases where there is considerable inflammation of the deeper tissues. Apply warm and partially cover with oiled silk, to be changed from time to time. You will thereby get excellent results and quickly. In the treatment of the more or less sub-acute Dr. Kassabian said he found more relief in putting his hand in hot water, carrying out the same principle of any other warm solution. If the hands are wrapped in gauze or absorbent cotton and covered with an impervious covering, it would keep up the nutrition of the parts. You will find that the sub-acute and chronic cases need

nutrition, as the nutritive function has been interfered with so long.

Dr. Wagner: In the early days of the x-ray I was burned very severely, not knowing the x-ray, and found it necessary to use some protection. I first turned to the use of the tube shield, so as to screen all the action of the rays as much as possible. I have learned to place a great deal of confidence in the protection of the tube shields. I am in the manufacturing business, manufacturing x-ray apparatus. Since receiving a burn I have become careful and carry a blank plate about in my pocket, and take great care not to expose this plate. In the evening some time ago I developed this plate. I think if the proper precautions are taken to use protection on the tube, that the operator would be perfectly safe with any reasonable amount of work. In not being in the room during the time the patient is being exposed to the x-ray is liable to divert the operator's attention and allow the x-ray to remain much too long. This very thing can be avoided by the use of a time slip so that when the time is up the switch turns off the current. It prevents further exposure so far as it is concerned. There is no question about it, the x-ray produces waste in the tissue more than can be absorbed by the natural functions.

In treating these x-ray burns I have found the use of the high frequency current very valuable to assist in the elimination of this waste material. I believe in treating the x-ray burn locally. The x-ray burn, of course, after it becomes chronic is an entirely different proposition. It seems as though the cells, after undergoing long continued irritation, in a good many cases cause an epithelioma. I have found it necessary to destroy these germs in chronic x-ray burns, and the most useful means has been by electrolysis.

Dr. Titus: It has been my experience to use the light in conjunction with my x-ray work, and I am pleased to state that when we have employed light, systematically applying it in cases of x-ray dermatitis in different states it has been beneficial. I find in looking for such a remedy as will restore nutritive means in the skin that the white of an egg brings about good results. We need to feed the tissues in x-ray dermatitis. We have a condition which requires physiological nutrition, and to get proper restoration I employ light. Light in connection with the x-ray is a prophylactic therapeutic measure, and has proven

efficient in dermatitis. I myself was one of the first cases. In endeavoring to restore physiological conditions we must employ physiological means.

Dr. Dieffenbach: I agree with some of the preceding gentlemen that the best place for the operator is in an adjoining room. We know dermatitis does not develop within two or six months sometimes, so that the dangers of exposure cannot be estimated.

Where there is not the necessary room the operator is compelled to be present during the exposure. Fluoroscopic work involves great danger. I would like to emphasize that. No operator should use the fluoroscope without lead glasses and other protection. Have a cover large enough to cover the diaphragm twofold. . . . I also approve of the use of filters in treatment with x-rays, when the so-called secondary rays, which I believe are the main cause of dermatitis, are eliminated by this means. I have had comparatively little experience in the treatment of dermatitis, but I agree with Dr. Kassabian that when we do get a case it is sometimes very intractable. I think the use of hot salt solutions is very good. I have experimented with numerous solutions and the use of heat in my treatment has been very beneficial.

Dr. Finkelparl: I think the salt solution is a rational treatment. The hydrate of sodium has rather a caustic action, but do not think there is any danger in its use.

Dr. Kassabian: I have used light in the acute stage of dermatitis from which I suffered. It was during the summer of 1900 that I used to expose my hand, about ten or fifteen minutes at a time, to the action of sunlight. That gave me some relief. There are many theories to account for the changes that take place. It is an important point to supply nourishing foods such as eggs, etc., in the chronic atrophic forms of Roentgen dermatitis.



THE CLIMATOTHERAPY OF TUBERCULOSIS; CONSIDERED ON PHYSICAL RATHER THAN BACILLARY GROUNDS.*

BY CHARLES DENISON, A.M., M.D., DENVER, COLORADO.

When used with reference to tuberculosis, which is as much the outgrowth of environment as any disease with which the human race is afflicted, the terms physiotherapy and climato-therapy are nearly interchangeable. For what is climate but a combination of the physical attributes which constitute the atmosphere of a given locality? Surely the density, the heat, the humidity, the movement and the light of the atmosphere are the physical properties which make climatotherapy synonymous with that physiotherapy which is the peculiar province of this World's Congress—Climatotherapy, then, is as much in its proper place here as are any of the modalities of physical or electrical origin, which constitute our present great special field of study. For we find that the whole of climate is physical, and the one determining or governing force which permeates all of its attributes is that incomprehensible and universal physical agent, *electricity*. Let us glance at these climatic attributes and see how this is.

1st. *The density of the atmosphere*: whether we speak of the increased pressure, as in caissons and in excavations of submarine tunnels, or the lessened pressure of the air on high plateaus or mountain peaks, it is all physical; a case of crowding the atmospheric atoms together or pulling them apart, thus changing their relation, not only to each other, but to everything contiguous. Thus is created a different phase of content and conduction of the electrical energy which permeates all space. The physical manifestations of atmospheric density or rarefaction are so closely allied to electrical manifestations as to make us question if electricity is not the basis of all life changes. The increased density of opposing currents, condensing or congesting moisture in electrical explosions of terrific force, or the expanding of the electrical content of the air under high altitude rarefaction are illustrations of this

* Read before the International Congress on Physiotherapy, held in Rome, Italy, October, 1907.

alliance, and I came to believe, and mentioned in writings many years ago,* that the positive electricity of the air seems to be brought so near to the negative electricity of the ground that the human body makes an easy conductor between the two, thus, in part, explaining the stimulating effect of mountain air.

The tendency to congestion in the capillary circulation in the periphery of the human body, and the quickening and perfection of both the arterial and venous flow in the pulmonary capillaries are positive facts, due to the relatively increased pressure existing in the lungs under the lessened atmospheric pressure of high altitudes. To verify this we have only to note the greater amount of air required in respiration, the florid complexions and bounding pulse, and the quickened breathing under even very ordinary exertion, which we find at all high altitudes.

How far these pulmonary changes, accompanying oxygen absorption and carbonic acid elimination, are electrical has not yet been satisfactorily explained. Associated as these pulmonary changes are with the production of heat and chemical action, they must be mainly electrical—yes, and any increase or diminution of these processes, due to climatic change, must be of the same nature—also electrical.

2d. *Heat*.—That “mode or rate of vibration of ethereal, atomic, or molecular or wave motion” (Gould). Why not say heat is motion and motion properly applied is electrical? The cycle of the absorption of heat from the great electrical source of heat and energy, *The Sun*, by living plants, its transformation into coal * and its reconversion into electrical energy, through the agency of combustion, graphically illustrates how electrical in quality is that thermal condition of the atmosphere upon which life depends. The temperature of the air is an index of its electrical state. High temperature with great density of the air, as in tropical climates, favors electrical conduction and nerve exhaustion—low air temperature with rarefaction, as in cool and relatively dry, high altitudes, is electrically stimulating and favors exaggeration of nerve energy.

This physical attribute, heat, is demonstrably electrical. It is favorably modified by lessened atmospheric pressure, and because of less enervation and expansion through increased

* “Rocky Mountain Health Resorts.”

radiation renders high altitudes preferable in the treatment of tuberculosis.

3d. *Humidity*.—We know that moisture has something to do with the electrical disturbances we behold in forming or impinging clouds, and we know, too, by the sense of smell that the falling cascade whips the oxygen of the air and water into an electrified or allotrophic form of oxygen called ozone. But not so easily recognized is the electrical process by which the food we eat and water we drink is being converted into heat units. Yet, how do we know but the increased amount of water drunk in dry rarefied atmospheres serves to compensate for the electrical increase outside the body in humid climates? There is certainly a largely increased transpiration of moisture from the lungs in the altitudes as well as the derivation of moisture through insensible perspiration: the whole process being evidence of the heightened elimination and increased metabolism which takes place in high dry climates.

4th. *Air-movement*.—Little need be said in substantiation of the electrical nature of that ceaseless motion of the forty-five miles thickness of atmosphere which surrounds our earth, contributing variety to climate and carrying purification and "healing on its wings" to every part of the globe. We feel the revivifying influence of the cooling breezes in overheated sections, and the electric tingle of the cold air in winter, emphasizing the conclusion which our previous consideration of heat impels—namely—The colder the air the more is the approach to comparative stillness of the air agreeable and healthy. But perfect stillness of the atoms of the atmosphere would not only be most undesirable and disastrous in its results, but impossible under viable conditions. Look at the beam of light coming through a small aperture into an otherwise totally dark room. Even your own breathing throws the dust visible in this beam into constant motion,—friction—and that motion means electrical conduction, very feeble, to be sure, but in kind like the stimulation of an ocean breeze. We are wont to complain of the dust which the fickle light air of altitudinous climates stirs up, especially in advance of approaching rain, but the harm, if any, is well compensated for by the electrification and washing of the air free of impurities as well as free of the visible dust. This cleansing is evidenced by the ozonized flavor of the purified air you sometimes notice after such storms. No, the wind

is a blessing, though unappreciated by some people who only allow themselves to think of tornadoes and cloudbursts. Not the least of the wonderful provisions for the good of mankind is the tempering of heat, through air-movements, without which our atmosphere would be unbearable. Also air-movement is synonymous to that universal distribution of atmospheric electricity essential to all breathing animals.

5th. *Light*.—We now come to that manifestation of electrical force, which is the highest of all the physical attributes which go to constitute climate. There is nothing comparable to the beneficent rays of the sun except sufficient space in which to breathe. We absorb, and live on, the energy of these rays—We grow in response to their stimulation. Of course, it is possible for us to exist with space enough in which to breathe, without the sunlight entering, but it isn't a natural kind of existence, and so, necessarily, it is abbreviated in time. We humans, as well as all animate beings, crave the sunlight, as much as does the last year's potato, which I remember to have seen in my youth, sending out its slender elongated sprouts at an angle of thirty or more degrees toward the single cellar window—the sunlight is the electrical life of the air. To successfully live, we must have it. It becomes a part of our being. There are few evils equal to the exclusion of the vitalizing influence of the sun from our dwellings, although this is practiced, not only by the poor, through necessity, but by the supposedly most intelligent people through ignorance. Moreover, there is nothing which leads more to the production of disease, except, as already intimated, the limited air space of those habitations. Here, as I conceive, is the crux of this tuberculosis crusade and the way to prevent this "Great White Plague." Does not our present study of the physical attributes of climate naturally lead to the conclusion that, if, as we know to be true, tuberculosis is a disease of environment (though marked by a specific germ as its later manifestation) then the physical conditions of that environment not only should but do offer us the real evidence of the first cause of its inception. Isn't the conclusion honest, and to be trusted implicitly, that the physical defects of the environment of the tubercular person are and should be the attacking points for remedial measures? Then, we have arrived at a point in our argument in favor of the physical explanation of our subject, which is most important and conclusive.

Prevention of Tuberculosis through Change of Environment.

The climatotherapy of tuberculosis is the environment which on the one hand, is causative and on the other hand, curative, or I will say, preventive of the disease. In either case, whether for cause or cure, the physical conditions are pre-existent to the life of the germ and should here absorb our attention. The germ is nothing more, anyway, than a vegetable mould growth and the advent of this germ cannot warrant any precedence in the etiology of tuberculosis over the deficiency of these physical attributes of climate we have been considering. That there is such a deficiency the well-known facts of our civilization prove—and confirmation comes through the almost universal adoption all over the world of the outdoor treatment for tuberculosis, which some of us have been advocating for over thirty years. The climatotherapy of tuberculosis, then, rests upon another well known fact that tuberculosis is essentially a house disease. If any one wishes to cavil at this statement, he will have no ground on which to stand, when he considers the multitudinous evidence which may be brought out against him in favor of the very close relation of tuberculosis to indoor life.

We have time only to briefly mention that aboriginal races are free from tuberculosis in their native outdoor life, but become, as did the American Indian, most susceptible to the disease when they adopt the indoor life of their civilized conquerors. Even the Esquimos, living in the Arctic regions where tuberculosis would otherwise be an impossibility, may have the disease because of the close, unventilated and unlighted huts in which they stay.

Dr. Chalmers (in showing the relation of tuberculosis to poverty) gives statistics for the city of Glasgow of the tubercular mortality in families represented by children attending school; i. e., according to the number of persons living in a room. The mortality rate in homes where there was one to the room was 3.4 per cent. from tuberculosis; where there were two to the room 5.9 per cent. and where there were three to the room 8.3 per cent. What better evidence of space per capita to increasing mortality from tuberculosis could be asked for, though these statistics were obtained for another object—the poverty of purse rather than the poverty of room space?

Animals, as well as man, when transferred from a natural

and open existence to a life of captivity, with its usual confined space, show the same acquired susceptibility to this disease. I once had an opportunity to study the effect of the environment, the inbreeding, the confinement and other conditions causing tuberculosis on a herd of some forty short-horn cattle imported from England to a farm near Denver by a tubercular patient of mine. This was about thirty years ago: within ten years thereafter the whole herd was decimated by this disease. How much continual inbreeding and infection added to the effect of the close confinement of these cattle may be left undetermined. I inspected the remnant of seven head, all thoroughly tubercular. The other males had been sold off, wherever found to be diseased, to be mixed with native stock in Northwestern Colorado. Those cattle sold, lived almost entirely in the open, and not only did they themselves seem to lose the evidences of the disease, as I understand, but their progeny, born of the native stock, turned out to be the best beef cattle in the State, three-year-olds often selling for four-year-olds as estimated in an Eastern market.

There is no doubt about tuberculosis being essentially a house disease.

Now why and how is it so?

The answer to that question ought to settle the question of prevention. Admitting that it is a house disease, its spread is for one of two reasons; first, because there is greater opportunity for infection in houses; second, because of the constantly diminished space, with or without limited light, allotted to the residents. Now, we find the first theory untenable for the germs have had "no standing in court" and are not in evidence until after susceptibility due to atmospheric conditions exists. The space explanation is, however, reasonable and ought to be clearly understood. Our greatest difficulty is our ignorance of the required sufficiency of space per capita in a sleeping or living room to equal normal or rather preventable conditions even for the average individual. We individually think we know what ought to be the legal minimum limit and what ought to be the generally acknowledged preventable or healthy limit—per capita space renewed once per hour—as did the renowned writer on public hygiene, Dr. Parkes. However, I may say the number so gifted with advanced knowledge on this most important subject is not great, and the masses are practically

blind to the insight which would enable them to understand the principle of hygienic ventilation. In this unknowing class I include the legislative bodies, who ought above all others to be fully posted so as to act in this matter. What is needed is general and thorough education upon this important theme of ventilation, up to which the study of these physical attributes of climate in relation to tuberculosis has led us.

Then what is further needed is such a pronounced and authoritative statement of rules or laws of house ventilation that the same will be broadly accepted as a basis of legislation for home and building construction.

If this present congress, or The International Congress on Tuberculosis to be held in Washington, D. C., U. S. A., in September and October, 1908, would formulate and endorse such acceptable rules, I believe they would go far toward solving the problem of tuberculosis prevention, which is at present attracting world-wide interest.



ON LIGHT IN THE TREATMENT OF DISEASES.*

Discussion.

Dr. Finkelpearl: I thank the doctor for his very valuable paper. His remarks in regard to the use of light in the treatment of smallpox remind me of where they keep smallpox patients in an old hospital with little or no light to speak of. I would like to hear from Dr. Brockbank in his conclusion what his experience is in the city of Philadelphia.

Dr. Barrett: This matter is exceedingly interesting to me. Recently I have been experimenting with ordinary incandescent lamp baths. I have now under treatment two cases. One is the case of a young lady, anemic, rheumatic and ill-defined pains everywhere. I used this light bath on her, giving first ten minutes at a sitting. At the end of eight minutes the perspiration became very profuse, the pulse went up about 20 beats and the temperature 2° . Afterwards I had her take a quick rub with a concentrated solution of sea salt, and when she reported in a couple of days she said the pains had left her. I gave her another bath similar to this one, carrying it on fifteen minutes with the same result. The perspiration did not come as readily as at first. The result was, that she felt a great deal better. The other two treatments I gave as tonic treatments. As soon as she began to notice slight perspiration I took her out at once. She said she felt stronger.

The second case was a case of anemia due to bronchial trouble. I carried out the usual treatment, giving her five sittings with the same method as in the other case, of only five minutes. Both of the cases said they were perfectly well, had no inclination to lie down, did not feel tired at all and felt as though they could go right to their work. I am very thankful for the doctor's paper. The only criticism I have to make is in regard to the organic life. I believe natural history teaches us that a blind fish has been found in the depth of the sea where light never penetrates. So there seems to be some organic life where the light does not reach. This subject of light is a question which I hope will be taken up more extensively, as it is a very important one.

Dr. Massey: Probably some of us who do not use light a

* American Electro-Therapeutic Association, Boston, September 19, 1907.

great deal have indefinite ideas on the distinction between what might be called the surgical use of light and the medical use of light. It might be a good thing to realize that one is a medical and the other a surgical use. The surgical uses would be perforce confined to the arc light, in its action on neoplasms, etc., while the use of the incandescent lamps to affect metabolism, etc., would be the medical use of light. Naturally my very limited experience on the subject has been altogether on the surgical side of the subject, and with the ten ampere Finsen lamp.

I understand that Dr. Bishop of Washington has done away altogether with the water cooling apparatus, in using the Victor Finsen lamp. I would like to ask him if that is a good thing to do, and where he gets the asbestos chimney to use in its place?

Dr. Pitcher: After listening to Dr. Brockbank's very interesting paper and his physiological views of light, I would just like to speak a word about the application of light in every-day work. We all must know its effect I think in acute internal troubles, and, as I have mentioned before, in diseases of an acute inflammation, as acute otitis media, laryngitis, bronchitis, intestinal troubles, also in stasis. It is a modality I have used with great satisfaction. I have had a number of cases of bronchial asthma that have responded to the treatment of the light, possibly better than to any other remedy.

Dr. Bishop of Washington: I wish to call the attention of the society again to the lamp. I mentioned it last year and promised to send a cut to Dr. Snow. This lamp as Dr. Massey stated I used for a long time in the original shape and was disappointed. I cannot say I have derived any great benefit. I did not feel that I wanted to throw one hundred dollars away and so searched around to make that lamp useful. I got some asbestos paper and made some cones and just wound around a tin box about the size of a tumbler, according to the kind of light I wanted to concentrate. I put a hole in the top and bottom, put the wire around the front of the rods that held the carbons, and let it go right under this again to hold it in position. Since using the lamp in that way I have had a great number of cases of lupus treated without the x-ray by using the arc lamp. I made a cone for Dr. Morse and he found it one of the most useful things he ever had. You can get the asbestos cement.

Dr. Dickson: The subject is one in which I have been greatly interested for a number of years, and I was very glad to see there had been such excellent results. Shortly after Finsen's death I was asked to prepare a report on his life work, which I did.

In regard to the incandescent lamp, I have employed it a good deal after x-ray work. When you are compelled to x-ray a part for a long time and the part gets in such condition, losing its tone very greatly and there is a fear of breaking down, the incandescent light will tone up the skin and improve the local nutrition of the skin. At present I have one of the most extensive cases of psoriasis I have ever seen. All other treatment has been put aside and he has been getting nothing but light from a 500 candle power incandescent lamp, and no new spots have appeared for over a month and all the old spots are gradually improving and the nutrition of the skin has improved very much. I think that the vibration on the skin produces a vibration under the skin that is transmitted into some other form of energy and transferred into the system.

Dr. Snow: Dr. Brockbank's paper is a most excellent résumé of the subject of light therapy and the Association is indebted to him for the same.

Dr. Dickson did not consider in his remarks the fact that the radiations of heat from the sources of *radiant* energy are very penetrating, affecting the deep tissues and heating them throughout; whereas the blood becoming heated by *convective* heat is conveyed to remote parts, and locally the temperature of the tissues is not raised, as was demonstrated by the experiments of Dr. Gilman Thompson, who has shown that the register of a thermometer placed within the body of a live animal which had been anesthetized and the abdominal cavity opened did not rise when convective heat was applied; whereas when the animal was killed, and heat similarly applied, the temperature was promptly raised.

While we are thinking of light from the actinic point of view, we must consider the effect from the two points of view; (1) the direct action of radiant energy upon the germs, distinct from the induction of hyperemia, and (2) the fact that with the increased hyperemia and relative influx of blood into the tissues, there is an increased number of the phagocytes. The effect then is two-fold; (1) the inhibitory influence upon the germs,

and (2) the increased influx of Nature's destroyers—the phagocytes. The influence of the heat upon the germs localized, is depressing, while the blood stream passing in and out, brings constantly within the field new blood with the relative number of phagocytes. Furthermore, it seems to have been demonstrated that heat at increased temperature is favorable to phagocytes, and unfavorable to most forms of germ life. With the incandescent lamp, we have the advantage of being able to make prolonged and frequent exposures without the danger of tanning or blistering the skin; whereas with the arc light, when tanning occurs, the penetration of the light, and to some extent of the heat rays, is prevented.

Referring to the surgical use of light, suggested by Dr. Massey, I would say that the use of the incandescent lamp in post-operative cases offers a means of great relief in removing the superficial infiltration when applied immediately after the operation. A Western physician, who called on me before an operation for hernia, was advised to purchase a 50 c. p. incandescent lamp with parabolic reflector to take to the hospital with him to use on the days immediately after the operation. The relief afforded and the benefit derived from the use of the light was a source of great satisfaction to the doctor.

Dr. Schaufler: Dr. Barrett stated that patients do not need rest after mild treatment. I think patients should have rest after anything of this sort. I think there should always be a period of rest after these treatments. In cases of bronchial asthma I find the use of this treatment producing relief for the time being, and would like to know whether others find it curative.

Dr. Nunn: I did not intend to say anything, but there is a point or two that strikes me as not having made plain. Some years ago I got into a discussion with a physicist upon the differences of heat. He stated that the solar heat and the artificial heat were the same and I contended that they were not. My reason for doing this was this:—If we take a piece of ordinary window glass and place it before the sun you will find the heat of the sun penetrates the window glass and you can feel the heat of the sun's rays on the other side and at a distance from the window glass, but if you touch the glass itself you will find it is cold. If you take the same piece of glass and put it before the fire no heat passes through until the glass itself

gets hot, evidently then, there must be some difference of vibration. There is a like difference of vibration between the sun's light and that of the fire. Now I am exceedingly glad to have had an opportunity of hearing this paper, and while I cannot throw much light upon this subject, because for the last few years I have not been practicing very extensively, I would say that the paper demonstrates one thing and that is this plain simple deduction, that we clothe ourselves too much.

In a practice of fifty years I have had a good deal of obstetric work and invariably my instruction to the mothers of children was to give them sun and air, to place them in a south room artificially warmed in winter and the windows closed if necessary when the sun was shining. While of course they would not expose their children to cold, they would place them there on a blanket in the full sunlight and let them stay as long as they could. I have seen weak children that became strong and vigorous after such treatment. All of this leads us to the conclusion that we clothe too much. If we could get people to understand that, we would be a good deal better off. It is a well known fact that when the Missionaries went to Terra Del Fuego men and women were going naked, icicles often hanging from their persons, nature having protected them by a layer of fat under the skin, but after they were required to wear more clothing they died. Protection was necessary and nature provided it; but when their method of dressing was changed then the dangers of civilization were brought about.

I have used electric light baths and have found great benefit from them personally, and I have seen cases of bronchial asthma which I had under treatment permanently cured, at least for two years. It has also served me good purpose in rheumatism.

Dr. Brinkmann: The words spoken by this gentleman are very true. There is a gentleman here who has been abroad where they believe to such an extent in this treatment that they have in the cities endowed public air baths and have air and sun baths. I request Dr. Dieffenbach to tell us what he has seen that applies to this subject.

Dr. Dieffenbach: The remarks of Dr. Nunn can be put down almost as absolute truths. The use of air and light baths has become a fad, and in Europe many sanatoria are trying them to improve nutrition, to treat rheumatism and also

for its known effects on any disease where faulty elimination is known as the cause. One of the latest uses of the light treatment is in cases of tubercular peritonitis. The mortality of that disease is great, and Dr. Oppenheim, who wrote an article on the subject, claimed in a number of cases in which he had used sunlight that he has had an apparent cure. If this statement alone will be taken home and applied, it may be the means of saving life. The personal observations which Dr. Nunn has made in regard to the discarding of superfluous clothing and wearing clothing which will permit proper penetration of air to the skin, also wearing clothes of such color which will permit of proper penetration of light itself is based on sound physiological principles. The more we learn on this subject the better it will be for our patients.

Dr. Brinkmann: The first man who devoted any time to this sort of treatment was Rikli, who had an institution between Italy and Switzerland, and that institution can be looked up to with a great deal of respect in the light of research. The originator of the light treatment for lupus was Maximilian Mehl. He used sunlight either through clear glass lenses or glass of various colors to a certain extent and secured results by cauterization, without cicatrices. This is still being carried on by his descendants and others.

Dr. Brockbank: We are told in a certain part of the Scriptures that in the beginning there was light and that it was the light that enlightened every man that came into the world—figuratively used of course, and it was said that this light came unto its own and its own received it not, but all those who did receive it received a great blessing and a great power. Now in the twentieth century there is another epoch in which there is a new light coming into the world and it is coming unto its own, and its own are inclined to receive it not, but all those who do receive it receive a great blessing and a great power because by the receiving and extending of the uses to which light may be put in their work they alleviate human suffering, in the curing of disease and distress. We certainly obtain one of the greatest powers and blessings that can be given the medical profession. It is also gratifying and quite true that more are willing to accept the light and are beginning to investigate and find out.

Answering Dr. Finkelpearl's question as to whether or not

I had any experience in the effect of chemical light in the lessening of the smallpox scars, I have not had personal experience and the cases I have known of have been treated in institutions.

Referring to Dr. Barrett's remarks as to the effect of light upon his patients, I think this is a very important point to note. I think the use of the thermometer is a very safe guide. There is a possibility of course in every element for good to be turned into harm. When the temperature increases it is time to stop the application. You have gone far enough and to go further will lessen the effects for good. Dr. Barrett said when he gave the treatment his patients said they felt like going back to work. This was because he stopped the treatment in time.

Dr. Dickson seemed to have an impression that I wished to convey the idea in regard to the incandescent light that it has a chemical effect. I said radiant energy is absorbed by the tissues and by some process, about which we know nothing at the present time, the cells seem to have a power of transforming that radiant energy into heat units and that stimulation takes place, dilatation of the blood vessels through the vasomotor nerves, and the elimination is very much increased. I heartily agree with Dr. Nunn that the wearing of so much clothing is injurious. I think we can see it demonstrated every day, especially by those who can remember back as far as Dr. Nunn. We have to-day a generation of women who are more robust and healthful than the women of forty years ago. In those days they sat about in the dark corners of the house and the only recreation they had was fine needle work, and if they showed any parts of the anatomy below the ears they were looked upon as immodest. Now they go about with their open-work shirtwaists, and I believe that is one of the reasons why we have a better people and more beautiful women than we had years ago.

Dr. Massey's attempted division into medical and surgical rays is too arbitrary. Actinic rays are more particularly valuable in some skin diseases on account of the germicidal action. This is partly due no doubt to the heat and to the improvement in the general condition of the patient by raising the opsonic index. If what I have said should lead only a few of you to a greater and further investigation of the ap-

plication of light, you need not begin with an elaborate equipment. Dr. Kellogg was a pioneer in the light treatment. He first used just a single ordinary incandescent light globe and found benefit from it and then made sort of a concaved shield, and he continued and built up and made an evolution until to-day we have a most elaborate outfit, but at the same time you can do the work with a comparatively poor machine. I hope you may be stimulated in your investigation and may become eager for light. The more light you get the more enlightened you will be.

CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.,

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(Continued from page 319.)

CHAPTER VI.

OPERATIVE DETAILS OF CATAPHORIC APPLICATIONS.

The author's personal experience in the cataphoric treatment of malignant growths, together with that of his colleagues using this method in the Oncologic Hospital, has indicated the desirability of varying the nature of the operation in certain cases by varying the position of the negative pole. In the operation chiefly referred to in the preceding pages, the large dispersing pad constitutes the negative pole, and is usually placed beneath the patient's back, or, at times, on the thighs. The end in view is the removal of this pole as far as possible from the active electrodes, in order that the ions diffused from the latter will penetrate deeply towards the base and periphery of the growth. Such penetration of the ions occurs in the lines of current flow, of course, and this means in large growths the inward transmission of a considerable bulk of current that must pass through neighboring nervous and muscular structures before it is widely dispersed, with the risk of temporarily tetanizing muscular structure and inhibiting nerve action. More than an amount suitable to a minor application is, therefore, to be avoided when the heart lies directly beneath,

as in operations on the left breast; when important nerves in the neck lie close; or when such a current must traverse the brain structures with the active electrodes in the orbit. This difficulty may be generally avoided by abandoning this monopolar method in major operations in such cases and using the bipolar method, in which the negative pole is placed on or in the center of the growth itself, the active, positive electrodes being thrust into the periphery of the growth. Effective work may be accomplished by this bipolar method, though possibly at times inferior to that done by the monopolar, for the ions will be dispersed to some extent from all sides of the active electrodes, fairly sterilizing the periphery of the growth, while its center succumbs to the simple electrolytic action of the negative pole.

OPERATIVE TECHNIC OF MAJOR MONOPOLAR OPERATION.

The propriety of general anesthesia having been determined by examinations of the urine, the blood, and the condition of the arteries, the patient is prepared for anesthesia the night before the operation by the administration of a saline laxative, and is directed to eat no breakfast on the morning of the operation, or a light breakfast and no lunch if the operation is to be performed in the afternoon. No local preparation of the growth itself is necessary, though an aseptic condition of the surrounding skin surfaces is best secured by applying a moist antiseptic compress for six or eight hours previous to the operation in purulent cases. Elaborate scrubbing of the growth should be interdicted as unnecessary and liable to cause metastasis by forcing malignant cells into the lymphatic or general circulation.

Before beginning the administration of the anesthetic all preparations of the apparatus for the operation should be completed. If portable apparatus is to be used, it is brought into the operating room and connected up as described in Chapter V. If the Cataphoric Table is to be used, it is merely placed in proper position with reference to the part of the body to be operated on. When any doubt exists as to whether the current will pass freely through the apparatus, it should be tested by connecting the final poles directly with a wire, turning the current on at the controller, and noting the deflection of the meter index; but if this is done the controller handle

should be turned back at once to prevent the possibility of an involuntary shock to the patient subsequently.

The active electrodes should now be selected and prepared, if this has not been already done. Each electrode or leash of electrodes should be laid separately on a tray placed on the cataphoric table or on a side table alongside the operating table, with their wires separately coiled and their ends attached to the one treatment binding post, ready for instant use at any time during the operation without interruption of the current. All electrodes liable to be used during the operation should be attached to this binding post before the operation is begun, unless the Cataphoric Table is used, with its special facilities for multiple attachments.

Having the apparatus in readiness, the operating table is prepared for the dispersing pad by placing a blanket on it, folded to serve as a cushion, over which is laid a waterproof sheet. On the sheet is placed the metal plate with wire attached, and over the point of attachment of the wire (which should be firmly connected to the plate) is laid a small piece of rubber sheeting to cover the wire as it lies beneath the edge of the kaolin pad. The plate is now ready for the warm pad to be placed on it, the pad meantime having been left in the sterilizer, where it has been kept warm and moist until the patient has been so far anesthetized as to be ready to be placed on the table.

The proper dispositions having been made and the patient anesthetized, the pad is placed on the plate and smoothed with a rolling pin to an uniform thickness. The patient is now placed on the table with the pad beneath his back, and the proper coaptation of the pad and the patient's back is noted, care being observed that no portion of the metal plate comes in contact with the skin. In large operations two pads should be used, the wires from both pads being attached to the negative binding post, or else a large kaolin mattress may be used to render the dispersion of the current as great as possible at this point.

If a microscopic examination of the tissue is to be made, it is necessary to remove the specimen before beginning the operation, as the action of the chemicals will render an examination impossible later. Aside from this necessity the operation is usually bloodless.

With everything in readiness, the electrodes are freely amalgamated and one is inserted directly into the periphery of the growth by simple pressure, the sharp points of the electrodes making this easy in spite of the brittleness produced by the mercury. The handle of the controller is then moved slowly until 50 milliamperes is shown by the meter. This amount is gradually increased, while the tolerance of the patient is tested by constant observation of the pulse and respiration, until 150 milliamperes is reached. At this early stage any intolerance is a mere pain reaction under a moderate stage of anesthesia. If more electrodes are to be used another is now inserted and the current increased, additional electrodes being inserted as the increased current warrants; it being remembered that effective work cannot usually be done when employing the major size of electrode with less than 100 to 150 milliamperes per point.

As the phenomena described in Chapter IV. develop, the electrodes that seem to have accomplished their purpose are removed, one at a time, re-amalgamated, and inserted at fresh points. In this way the whole of the growth is gradually brought under the influence of the diffused ions, while a proper concentration is maintained.

In a period of time, varying from twenty minutes to an hour, in accordance with the size and situation of the growth and with proper placement of the electrodes, the whole of the apparent limits of the diseased tissues will be included in the area of necrosis. The completeness of this effect can be ascertained by both sight and touch, the change of color to a whitish gray being absolute. The change to touch—a distinct softening of the brawny induration—is particularly valuable in situations where inspection by sight is difficult, as in the vagina and rectum, though this change is a valuable test in growths in any situation. All evident extensions of the disease should be included in the area of necrosis if possible, the surrounding zone of tissue reaction being depended on for the destruction of the non-evident prolongations only.

In external growths special attention is paid to the periphery, particularly that portion extending toward the situation of possibly infected glands. Enlarged glands should be attacked at the outset of the application and the intervening tissues usually destroyed also, as the possible lurking place of infected cells.

When the application is made to the head, neck, or near the heart, the pulse and respiration need special attention, as large currents tend to depress both of these vital functions. Should irregular action be observed, an immediate turning down of the current, without unnecessary suddenness, will cause an instant revival of both force and regularity. In fact, though the steady action of a heavy current is a depressant, the act of turning it off is a most valuable stimulant to the vital functions when depressed by the anesthetic alone. This is owing to the well-known fact that nerve and muscle respond to any change in the volume of a current traversing them, whether an increase or decrease, rendering a cataphoric operation safer in this respect than other operations, aside from similar advantages of conservation of blood and absence of shock.

As to the proper current strengths to be employed, much will depend on the condition of the patient, but more on the location of the growth. The author's personal experience indicates that the following amounts may be safely employed in the several situations mentioned, growths too large to be necrosed quickly by these currents requiring either that the current be continued for a sufficient time to obtain a full effect, or that the monopolar method be changed where possible to the bipolar method, with which much stronger currents may be used:

Maximum Currents Safely Applied by the Monopolar Method.

To the Head, Mouth, Throat, and Neck. . . . 300 to 400 ma.
To the Left Breast . . . Minor monopolar applications only.
To the Right Breast and Thorax generally, 400 to 800 ma.
Below the Waist. 800 to 1,600 ma.

Special procedures relating to the insulation of electrodes, and cooling the site of application when necessary in applications within contracted cavities, will be found in the chapters devoted to the destruction of malignant tumors within the vagina and rectum.

The proper effect having been gained after an appropriate current-strength and duration, the current is slowly turned off finally, the electrodes removed, and a dry sterile dressing applied.

(*To be continued.*)

Editorial.

STANDARDIZATION OF PHYSICAL MEASURES.

THE present generally vague notion of the therapeutic indications and applications of physical methods, is leading to all sorts of indifferent employment of these measures particularly with the beginners, who from the reading of the various writers as published to-day, derive views so diverse and non-specific, that they are at sea from the outset. This state of affairs suggests the importance of adoption of standards of indication and methods by some association of intelligent workers, for the purpose of establishing a definite expression of the physiological actions and therapeutics of the various methods of treatment. For the accomplishment of this important work, no body of workers is more ably equipped and properly constituted than the membership of the American Electro-Therapeutic Association, who have now undertaken this important task. That such a movement has been instituted is a source for congratulation.

At a meeting of the Chairmen of the Committees of this Association held on June 13th, in New York, a policy was outlined, which indicates an interest and effort at standardization which assures the adoption; or at least the institution of an important movement towards its ultimate accomplishment. The degree of success of these co-working committees will depend upon the energy and judgment exercised by the Chairmen and individual members of the respective Committees.

An important requisite of this movement is the evolution of a definite knowledge of the relation of the physical properties to the physiological action of every one of the modalities or sort of application of physical character adapted to therapeutics, with reference to the indication of methods, including dosage, intensity, and duration of administration.

Those who at the present time place twenty or more patients in line, before a static machine, with a view to giving them a few minutes' application of static sparks or breeze, expecting to derive any therapeutic effect from such applications, are men who give no serious attention to the physical properties of the current but appeal to suggestion; while those who are familiar with the physical and physiological actions of the currents

derived, employ a definite technique, adapted to the physical indications of each case, and obtain marvelous results in conditions not responsive to suggestion. The same is true of the desultory or indifferent employment of every other physical agent.

The present drift of medical science is from empiricism to the investigation and adoption of scientific methods. Of the measures which now offer anything of positive nature, none compare with the possibilities of the so-called physical agents, which produce physical effects in accord with physical laws, exerting influences upon the tissue of definite physiological character; comparatively easy of demonstration, as to their ultimate effects upon the tissues. Such methods, when confirmed by successions of similar results, determine definite physiological laws of action, as definite as the laws of physics themselves. This granted, how important the scientific study of these subjects; and how great the possibilities for the relief of human suffering.

Only those who can appreciate the force of these statements, who have followed them scientifically and with energy; together with a willingness to devote time enough to each individual case, to induce the necessary degree of alteration of metabolism, or relief of a congestive process, will employ them with any measure of success. No desultory indifferent employment of physical measures can ever be followed by successful results. In other words, indifference and carelessness in matters of technique are the greatest impediment to success in the employment of these measures. The physican who wishes to follow a lazy, pleasure-seeking life, is not the man to undertake the employment of physical therapeutics. It is work for toilers, and scientific men who look above all to the interests of their patients. With such only can success from these measures be obtained.

* * *

THE PRESIDENT OF THE AMERICAN MEDICAL ASSOCIATION.

THE American Medical Association has again awarded its highest honor to a man entitled to recognition from the merit of the great work he has accomplished. Wm. C. Gorgas,

the modest unaffected physician, by the exercise of supreme effort and energy, has marked a new era in sanitary possibilities by ridding the Isthmus of Panama of the scourge of yellow fever in the canal zone, with the reduction of the death rate to that of the best managed towns in the temperate zone. No greater triumph of modern prophylactic medicine has been accomplished than this work under the direction of Dr. Gorgas, and that he should be awarded the highest honor in the gift of his profession, as a recognition by his fellow physicians for the great work he has accomplished, is a matter for congratulation.

Progress in Physical Therapeutics.

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

The Relation of Opsonic to X-Ray Therapy. Medical Record, April 18, 1908.

In an editorial in the Medical Record under the above caption, the reference was made to Dr. A. W. Crane's paper in the American Journal of Medical Sciences of March, 1908.

In a case of pustulous acne, in which the infectious process was found to be staphylococcus pyogenes aureus, before giving the x-ray treatment, he estimated the patient's opsonic index. After one exposure to the rays, the opsonic index rose, on two of the succeeding days. On the fourth there was a slight fall, and a second treatment was given, when the index again increased and the acne disappeared a few days later. The same results were obtained in cases of lupus, and one of tubercular glands of the neck. In all the cases the x-rays ceased to raise the index when the infectious agent was presumably eliminated. "In the patient with acne, who apparently had no tubercular lesion, the opsonic index to the tubercle bacillus remained unchanged, showing that the x-rays do not appear to stimulate the production of opsonines for bacteria in general, but only for those in living tissue brought directly under their influence." Crane acquired these results in a few treatments which he attributes to careful timing of the latter, the opsonic estimation

enabling him to give each treatment just as the positive phase began to decline.

Wright has shown that large doses of bacterial substances plunge the patient into the negative phase from which he may never recover, and Crane thinks it quite possible that too many x-ray treatments have the same effect and that the sudden relapses, which x-ray operators sometimes see, might be explained in this way. He concludes that the repetition of exposures, as far as possible, should be governed by the duration of the negative and positive phases, and that in affections in which the disease-producing agent is as yet undetermined, one should be governed by analogy with those cases in which opsonic estimations can be made. It follows that as a rule the treatment should not be repeated oftener than twice a week, and probably usually at less frequent intervals. The immunizing substance set free under the influence of the x-rays is of necessity autogenous, which, Crane holds, is an advantage over the opsonic therapeutics; in which the vaccine is often made from a stock culture instead of from the bacteria from the patient.

These observations from the paper by Crane are in accord with the views expressed in an article published in this JOURNAL by the Editor of this department from the subject "Tubercular Antitoxin," in December, 1906, when it was shown that the inhibitory action of the rays placed the germs at a disadvantage to be destroyed, or that some of the germs are destroyed by the opsonic action of the x-ray, in a similar manner as by injected opsonines. In the use of the x-ray, however, this method has the advantage over the method of Wright, in that a particular germ at the site of the infection is unquestionably made the source of opsonic changes.

EDITOR.

RADIOGRAPHY.

EDITED BY HERMAN GRAD, M. D.

The Study of Constipation by Means of the X-Ray. By Arthur F. Hertz, M.A., M.D., Archives of the Roentgen Ray, June, 1908.

From data previously obtained, the writer began the study of constipation by means of the x-ray examination in connection with the use of the salts of bismuth. Until recently, it was

not thought possible to administer bismuth salts with safety in larger doses than 1-2 dram to 1 dram. " In 1897, Roux and Balthazer gave 5 drams of bismuth subnitrate for diagnostic purposes, and soon afterwards Rieder found that 1 ounce could be administered without danger. Later observations, however, have shown that bismuth subnitrate, the salt first employed, occasionally gave rise to severe poisoning when large doses are given. Böhme reports a case of a marasmic child, a year and a half old, suffering from gastro-intestinal disturbance, whom he gave several grams by the mouth, and two days later by the rectum. Three hours later the child was seized with pain and diarrhea; he became cyanosed and dyspneic, and died in half an hour. A child three weeks old, suffering from gastro-enteritis, had died with similar symptoms after the administration of four grams of bismuth subnitrate by mouth in the same hospital early in 1906. Worder, Sailer, and Pancoast report six cases, in which alarming symptoms of poisoning were observed in adults after 2 to 4 ounces of perfectly pure bismuth subnitrate had been given in one dose. The American authors believe that some nitrite was formed from the subnitrate, as the symptoms, (nausea, cyanosis, prostration, full, bounding, and rapid pulse, and fast respiration) were similar to those of nitrite poisoning. Böhme found nitrous acid in the blood and pericardial fluid of his patient after death, and methemo-globin was present in the blood. In the stomach, nitric acid is produced by the action of the gastric juice on bismuth subnitrate, and this is converted into sodium nitrate in the small intestine. If insufficient HCl is present in the stomach to act on all of the very large doses of bismuth subnitrate given the residue of the salt is converted into sodium nitrate; the reduction probably occurring in the intestines, as " Böhme found that when feces are added to bismuth subnitrate *in vitro* some nitrous acid is produced. From four ounces of bismuth subnitrate one ounce of sodium nitrate is formed, so that, even if only a very small proportion of the nitrate is reduced, a dangerously large quantity of nitrate might be absorbed. From these observations the writer has been induced to employ carbonate of bismuth in one and two ounce doses on a very large number of occasions both to healthy individuals and to patients, without ever observing the smallest ill effect. The carbonate, however, has one disadvantage over the subnitrate; i. e.; when bismuth sub-

nitrate comes in contact with the gastric juice, the formation of bismuth oxychloride is associated with the liberation of free HNO_3 in amount exactly equivalent to the HCl used up. Hence the acidity of the gastric juice remains unaltered. On the other hand, a large dose of the carbonate completely neutralizes all the free HCl in the stomach, and the CO_2 liberated does not in any degree replace it. Hence the all-important influence of the free acid in the stomach on the control of the pylorus is lost, and the rate in which the stomach empties becomes abnormal, although the actual movements of the stomach and intestines are not altered. In order to avoid this source of error in investigating the stomach, the writer has used since February, 1908, bismuth oxychloride in 2 ounce doses instead of the carbonate. This is chemically inert in the stomach and is also uninfluenced by the alkaline intestinal contents. In the large intestine a small proportion, just as in the case of all other bismuth salts, is converted into sulphide by the free sulphuretted hydrogen present; but it is very improbable that this can have any influence on the intestinal movements.

With neither the carbonate nor the oxychloride was constipation or any other disturbance in the normal activity of the alimentary canal ever produced, so that the results obtained by the x-rays could be looked upon as normal and uninfluenced by the bismuth meals. The bismuth is best taken well mixed up in a bowl of bread and milk, when it is not very unpalatable. It may also be taken in the form of bread made from flour which has been mixed with bismuth oxychloride, either of which is superior to the administration by suspension of the salt in milk or any other fluid, except in the examination of the esophagus, as with their aid the behavior of the stomach and intestines can be studied in conditions more closely approaching those which follow an ordinary meal.

The writer then reports five cases, substantially as follows:

Case 1.—Constipation Associated with Visceroptosis, Due to Weak Abdominal Muscles.—Patient was thirty-eight years of age, and suffering from severe constipation, following a difficult labor two years previous. The abdomen was found to be distended and slightly tender. The abdominal muscles were feeble, and the recti separated from each other by more than two inches. The right kidney was movable, and on standing the abdomen became quite prominent below the umbilicus, but

retracted above it, showing that a considerable degree of enteroptosis was present. He subsequently disclosed the fact that the colon was normal in position, so that the small intestine was the only part of the gut which dropped down in the vertical position. By lifting the contents of the stomach upwards, discomfort was relieved, indicating its cause to arise from the pull of the dropped viscera.

Two ounces of bismuth carbonate in bread and milk was given at 3 p. m. When examined with the x-ray in a vertical position, her stomach was seen to be of normal size but very low in position, the greater curvature reaching below the level of the iliac crests. By voluntary contraction of her abdominal muscles she was only able to raise her stomach about 1-2 inch, though manual pressure applied below the umbilicus lifted it into the normal position.

At 11 a. m., the next morning (April 7), the stomach was not seen; the cecum and ascending colon contained only a trace of bismuth, but the whole of the transverse colon, and iliac colon were clearly visible.

In this case it was evident that in spite of the well-marked ptosis of the stomach and small intestine, there was no ptosis of the colon.

Case 2.—Constipation Associated with Visceroptosis, Due to Weak Abdominal Muscles.—Patient aged forty-nine had suffered from biliousness and slight constipation for many years. Following an attack of influenza in 1907, she has had a feeling of weight and sometimes actually pain in her abdomen, except when she lay down. She has also been more constipated than before,—her bowels being open only once in every four to eight days.

On examination she was found to have weak abdominal muscles, but no separation of the recti, and on standing the lower part of the abdomen bulged, and her discomfort was relieved by pressure below the umbilicus. Examination by the x-ray after a bismuth meal, given at 6 a. m., on March 25, showed that only a trace of the bismuth had reached the cecum in six hours, and that in ten hours the very short ascending colon was filled. Twenty-eight hours after the meal the splenic flexure was reached. Although the passage through the small intestine was rather slower than usual, the splenic flexure was reached within the normal limit of time. However, twenty-

four hours later, though the cecum was now empty, the bismuth had reached no farther. Confection of senna was given the same evening and a glycerine suppository the following morning, with the result that the bowels were well opened, and all the shadow was found to have gone at 10 a. m.

Case 3—Constipation in Landry's Paralysis. A bank-clerk aged twenty-two, became paraplegic in September, 1907. The paralysis rapidly spread up his trunk to his arms and his neck. It reached a maximum in about fourteen days, after which the arms, and to a less extent the trunk, gradually regained their power. There were no sensory symptoms. There was retention of urine only during the first week. Diagnosis of Landry's paralysis was made. The patient's bowels which had been previously normal, from the onset of the trouble had never acted without an enema, aperients being of no use at all. Later the enemata only brought away a few small, hard scybala. On February 23, the whole descending colon and loop of the sigmoid flexure could be easily felt filled with small scybala. The rectum was filled with hard scybala, but not distended. There were none of the usual signs of auto-intoxication. On February 26, at 6 a. m., after previously washing out the rectum and colon, two ounces of bismuth oxychloride were given with a pint of bread and milk. At 10 a. m., the cecum and part of the ascending colon were visible. At 4 p. m. the first part of the transverse colon contained a small quantity of feces and the whole of the ascending colon was distinctly visible. In the morning no enema was given, and the patient's bowels were not opened, and the whole length of the colon from the cecum to the lower end of the colon were visible. The paralysis in this case had not been associated with any change from the position of the colon, undoubtedly due to the fact that the patient had been kept in a recumbent position.

Skiagraphic examination showed that the passage of the feces was normal in rate up to the rectum, so that no paralysis of the intestines was present. On February 28, and on most mornings afterwards, the patient opened his bowels without the aid of enemata or medicine.

The constipation in this case had undoubtedly arisen from the relaxed condition of the abdominal muscles.

Case 4—Constipation with Hypochondriasis. A medical man aged forty-five. On palpation the cecum and ascending

colon appeared to be normal; the transverse colon was not palpable, and the descending colon was felt to be contracted, but not more than is often the case when it is empty. The rectum was normal and contained a little feces.

On March 31, 6 ounces of olive-oil were injected per rectum and retained during the night. On April 1, in the morning at 7 a. m., a soap enema was given with a good result. At 8 a. m. 2 ounces of bismuth oxychloride were taken in bread and milk. At noon the cecum and part of the ascending colon were visible. The next morning the proximal half of the transverse colon, normal in position, was clearly defined, and the distal half only contained a little bismuth. On April 3 the splenic flexure was reached, and a little bismuth was found in the descending colon. On April 4, the fourth morning—the cecum, ascending colon, and commencement of the transverse colon were empty, whilst the distal half of the latter and the whole descending colon were seen. The lumen of the descending colon was no smaller than that of the ascending or transverse colon, so that nothing like the stricture described by the patient was really present. The whole series of tracings could, in fact, quite well represent the passage of a bismuth meal through a normal colon, if it were condensed into two days instead of four. The sluggishness was, as usual, most marked in the peripheral part of the colon, the ascending colon being traversed at the normal rate.

The constipation in this case was mainly due to the insufficient residue left by the diet, carefully chosen by the patient for its non-irritating character. The skiagraphic examinations had an excellent effect upon the patient, as they served to prove to him that his ideas on the abnormal anatomical condition of his colon, which had worried him for many years, were quite erroneous.

Case 5—Constipation Due to Cancer of the Sigmoid Flexure.—Female aged forty-nine, had been somewhat constipated for many years, with attacks of violent pain in the lower part of the abdomen, accompanied by retching and vomiting, recurring every three or four weeks. Her abdomen was found to be distended, peristalsis of the colon could be seen and felt. On April 15, the patient was given two ounces of bismuth oxychloride with bread and milk at 6 a. m. At 10 a. m., the cecum was just visible; at 12 p. m., the cecum, transverse colon, and part of the descending colon were seen. At 4 p. m. no further

advance was noticed, but the shadow was deeper, and the shape of the transverse colon had altered.

The next morning—April 16—the colon was visible up to a point in the sigmoid flexure, just to the right of the middle line. Two days later on April 18, the colon was seen to be much more dilated, but no trace of bismuth had penetrated beyond the point of the sigmoid flexure reached on the morning of the 16th. No active movements were observed.

The patient's bowels were opened by an enema the morning after her admission. In spite of the daily use of enemata, they were not again opened before the operation performed on April 23. A cancerous obstruction was found in the sigmoid flexure, which was too adherent for removal, so a colotomy was performed.

PSYCHO-THERAPY.

EDITED BY LESLIE MEACHAM, M. D.

Method of Exploring the Boundaries of Fistulous Tracts and Abscess Cavities, by Emil G. Beck, M.D., Chicago, Journal of the Roentgen Ray.

The writer describes a method of injecting bismuth paste consisting of 33 per cent. bismuth subnitrate and 66 per cent. of vaseline, and then taking a radiograph of the region so injected. After cleansing the mouth of the fistula with alcohol all secretion is wiped off, and a fine strip of sterile gauze placed into the opening, a glass syringe with a blunt nozzle, like that of the Valentine urethral irrigator, which has been sterilized by a dry process and charged with the paste while in a liquid state, is employed. The nozzle is placed against the opening and the contents gradually forced into the fistula, until the patient complains of pressure. Then the syringe is removed and a piece of gauze quickly pressed against the opening to prevent the escape of the fluid until it has sufficiently hardened. An ice bag may be applied to hasten the solidification of the paste within the fistula. Care should be taken that water is not mixed with the paste. The radiograph is then taken. He reports six cases which well illustrate the practicability of the method. The writer's conclusions are as follows:

1. A surgical operation on fistulous tracts depends for success principally upon the exact knowledge of the extent and direction of the sinuses before operation.

2. Radiographs taken after the fistulæ have been injected with bismuth paste show distinctly the extent and direction of the fistulous tracts.

3. Skiagraphs of all fistulous tracts should be taken before an operation is decided upon.

4. Fistulous tracts, tubercular sinuses, or abscess cavities, including empyema, can be cured by injection of bismuth paste.

5. The bismuth paste, when mixed with wax or soft paraffin, and injected in a liquid state, solidifies in the fistula, and serves as a framework for new connective tissue. The paste is absorbed and the fistula obliterated.

6. Bismuth paste injection will not, however, heal sinuses where sequestra are present. These must be removed before injection.

7. The bismuth paste injections are painless, and produce no unpleasant or dangerous symptoms.

An Analysis of Psychotherapeutic Methods. By F. X. Dercum, M.D., *Therapeutic Gazette*, May, 1908.

The writer begins a consideration of the subject with a review of the fact that mysticism and superstition have in all times played a rôle in the treatment of disease. He goes on to say that the Egyptians, the Hebrews, the early Greeks and Romans, and the barbarous savages of all ages have been under this cloud. He then adds that it is safe to say "that these methods which appeal to the emotions and to the superstition inherent in man's nature are not debarred by civilization or by supposed scientific enlightenment;" and illustrates this fact by calling attention to the recognition of mesmerism in Vienna and Paris in the 18th century. He refers to treatments employed as the Bergeon treatment of phthisis by the injection into the rectum of sulphuretted hydrogen, and the practice by neurologists of hanging their cases of locomotor ataxia, as belonging in this category. He refers to "the faith cure of Dowieism and Eddyism as indisputable and unpleasant proofs," as instances of psychic epidemics of this nature; and observes that we may forgive the ignorant when they seek the sacred relics, the sacred shrines, the sacred springs; but what shall we say of those who possess an average of modern education and intelligence?" His inference is that these epidemics are in their nature psychopathic, leading to a suspicion as to the sanity of the claims of mystic medicine. He calls attention to the fact that at this time when medical men in high station are "saying strange things, talking in a strange language, and doing still stranger acts; there is a demand that the profession halt," "that it should critically determine the facts and purge itself of error in order that at least some semblance of sanity may be preserved." He considers this to be an age of fads; "an age when the unessential, the intangible, the weird and mystic are pursued, when high-sounding words and phrases take the place of ideals, when metaphysical vaporings replace scientific observation and trivial noth-

ings the solid truth; when wretched commonplaces inspire admiration; when worn-out platitudes become strokes of genius; and when the imbecilities of hysteria become the final word of wisdom and of morals." He calls attention to the fact, that the psychic means of treatment have been practiced by the profession in all ages, as in our day, legitimately and properly, and that we employ suggestion consciously or unconsciously in our daily contact with our patients, and to their benefit. He considers it "an adjunct which aids in an unmistakable manner even in incurable cases; but it is rarely that physicians can rely upon suggestion alone." He says truly, "that other things being equal, a man who feels sure of getting well, eats better, and sleeps better; the very action of the heart is also promoted by this hopeful and contented attitude of mind; whereas a man whose mind is tormented by doubt, or that he is stricken with a serious or possibly fatal malady, instead of co-operating with the physician in a whole-hearted manner, he looks upon the treatment and its various details with doubt and suspicion. He takes less food, and his sleep is disturbed." The writer then undertakes the description of various methods which may be employed in the treatment of the patient, which he divides into *general* and *special methods*.

General methods consist of mental rest and mental exercise. Everyone knows to how great an extent fatigue enters into the production of the mental symptoms met with in the functional neurosis, the rest absolute or partial becomes at once a factor of potent value in the treatment. Mental exercise is likewise a factor of supreme importance and value. Everyone knows the health-producing power of work and occupation. An occupied mind ceases to be introspective, assuming an objective attitude, occupying the mind with things external to the patient, many of his symptoms receding in direct proportion.

"Among the special methods we have, first, normal suggestion—that is suggestion in the waking state; secondly, suggestion under hypnosis; thirdly, the method of psycho-analysis or catharsis devised by Breuer and Freud some years ago; and fourthly, the method of exciting the emotions by an appeal to the religious feeling and the superstition of the patient."

The normal suggestion is direct or indirect; the indirect being the form which is habitually used by physicians generally unintentional, and even unconscious, both physician and patient being unaware that suggestion in any form is being made but it is none the less potent. Direct suggestion consists in the frank statement to the patient that he is improving or he will get well. "With intelligent patients the physician should explain the condition in elementary terms, which will be generally satisfactory, while with the ignorant all explanations should be avoided."

He then refers to the use of placebos, the employment of

capsules of starch or boric acid to produce sleep. He also quite irrationally places the physical methods as electricity, magnetism, and many forms of baths, of massage, and manipulation, in the rôle of placebos, stating that there can be no doubt that many of the results, especially the rapid cures, are due to suggestion.

The placebo in this connection seems to be the burden of the writer's thought, as playing an active part in suggestion. And right here, the force of therapeutics loses its real efficiency in the mind of the writer and those who take this attitude. For in the light of the present experience of those who do use physical measures intelligently, the placebo is an absolutely unknown quantity; and the man who ignores local causes of reflex neuroses, giving only placebos and suggestion in the treatment, utterly fails. When such men as the writer of this paper employ auto-suggestion, recognizing the organic causes of nervous disease, employing measures directed to the removal of these causes, very little will be said of placebos. There are few patients in whom there are no indications for the employment of means looking to the employment of general metabolism, and the exercise of a rational knowledge and employment of causes directed to their removal. With these, suggestion plays but a partial rôle, though important in the treatment of diseases of the nervous system and elsewhere.

EDITOR.

THERMOTHERAPY.

EDITED BY DAVID E. HOAG, M. D.

Active Hyperemia by Hot Air. Its Indications for the General Practitioner. By Edward A. Tracy, M.D., Boston, Mass., The Medical Council for February, 1908.

The writer observes that Bier has found that with the air heated to about 212° the surface becomes red, and freely perspires; and that, after the removal of the limb from the hot air apparatus, on drying and dressing it, the agreeable sensation experienced while it was in the hot air bath, persists for some time, and that measurement with a surface thermometer shows an increase of the limb's temperature which persists for an hour, and even longer, after removal of the limb from the apparatus, proving that the hyperemia is due to the heated air temperature. He calls attention to the fact that the whole body sweats as the knee is exposed to the hot air, with an increase of

body temperature. He limits the exposures to hot air to one hour a day. He also states that local applications increase the appetite and metabolism, and enumerates the following physical effects of hot air:

(1) Analgesic.—A joint attacked by painful chronic rheumatism becomes less sensitive and occasionally painless after one hour's treatment with hot air. This is also true of injured joints. He suggests that the active hyperemia may wash away poisonous substances that cause pain by injuring nerve endings, ignoring the fact that relaxation relieves pressure and pain. He does not state how long this relief from pain lasts.

(2) Absorptive.—In edema following fractures, this effect of hot-air hyperemia is demonstrated. Also in elephantiasis, and joint effusions, which he explains to be due to the opening of the channels of elimination, which he attributes to the blood vessels and not the lymphatics, as demonstrated by Orlow and Hamburger, not referring to the action of the sweat glands. The latter saw that after ligation of the thoracic duct absorption from the abdominal cavity took place just as rapidly as when the lymph current was unobstructed.

(3) Solvent.—The solvent effect on hyperemia, he suggests, causes absorption of blood clots, granulations in joints, and nodules in tendons. The conditions to which the writer here refers are general inflammation constituting the so-called "obnoxious stasis" of Bier.

(4) Nutritive.—Bier frequently treated ulcers which had not healed by other remedies with hot air, and he attributes his success in curing them to the building up and rejuvenation of the tissues due to the nutritive effects of hyperemia, in which he fails to recognize the fact, however, that the persistence of ulcers is due generally to the persistent induration which can be relieved by hot air only in the earlier stages. These statements summarized the physiological effects considered by the writer. He then refers to the treatment by heat of chronic articular rheumatism, and arthritis deformans. As a matter of fact in the experience of nearly all other observers, these conditions are only partially assisted by the use of hot air treatment or, as he calls it, "hot air hyperemia." He then refers to the treatment of neuralgia, sciatica, and lumbago, as having been relieved and in some instances cured by hot air treatment. He refers farther to its employment in traumatic synovitis and the treatment of fracture in which a few cases are reported as improved or cured. The writer of this paper has failed in particular to recognize the great value of dry hot air in the treatment of infectious conditions: he has also employed dry hot air as one of the means of inducing hyperemia for therapeutic purposes.

As a matter of fact, Bier was not the early champion of these methods, and he may have failed to give credit to many others

who have used it long before he did, and from a more comprehensive point of view than the induction of hyperemia. Furthermore, the claim of the hyperemia treatment, emphasized as it is in the name of Bier, overlooks the fact that similar means have been employed except his method by bandaging in the treatment of joint affections. The method of treating inflammation by cupping, and the use of heat, hot air and counter-irritation, while not designated as treatment by hyperemia, have, however, produced that effect, and Bier and his followers have failed generally also, as has the writer of this paper, to recognize the important part that hyperemia does play in increasing phagocytosis, so important when infection is present, as well as the fact that heat applied as described produces an inhibitory effect upon the germs in areas so exposed. Coincidentally with the increased hyperemia, phagocytosis becomes a factor in removing infection, whereas the inflammatory processes associated with stasis, designated by Bier "obnoxious stasis," are not materially benefited by this form of treatment, but by methods designed to energetically remove the induration of stasis.

EDITOR.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Heat and Cold in the Treatment of Joint Rheumatism.

Dr. Edward Weisz (Modern Medicine) states that no patients are so sensitive to the conditions of the weather, especially to the changes of temperature, as the rheumatic. It can be as truthfully stated that in no class of patients does the use of heat and cold play so important a part as in the rheumatic, especially those suffering from the joint affections. Without entering into the discussion of the theoretical side of the question, the author deals with the practical side only, from personal experience with a large number of cases during many years.

In the acute stage, the so-called polyarthritic acute rheumatism, full baths are seldom advisable because of the extreme suffering which is caused by the slightest movement. The cooling bath may, however, be indicated in the rare cases of hyperpyrexia with a body temperature of 41° - 42° C. (105.8° - 107.6° F.)

In most cases only local applications are employed during the acute stage. As the condition of the various joints often

differs decidedly, the treatment must vary accordingly. Certain conditions are usually found in connection with an affected joint; namely, inflammation, as shown by the redness of the skin, and increased temperature and swelling with more or less pain. These conditions do not always run parallel, as some cases present considerable redness with only a slight degree of swelling, while others are much swollen, with very little redness. The pain, though usually being in proportion to the clinical findings, is not always so, as in some cases a very badly affected and very painful joint may present very slight swelling. The pain does not depend alone upon the sensitiveness of the nervous system.

On account of these variations in different cases and even in different joints of the same case it is sometimes very difficult to adopt the treatment to meet the individual requirements. This is especially true, as we have no means of securing an absolutely accurate measurement for the amount of heat or cold required. We are thus obliged to ascertain as nearly as possible the amount of heat or cold best borne when any one of the three conditions—swelling, redness, or pain—is predominant.

When there is considerable redness of the skin, cold is the remedy best adapted to its reduction, and should usually be given in moderation, both as to time and temperature. Continuous cold can be administered by means of the cooling coil with water at a temperature of 12° C. (52.6° F.) or below. The most useful measure is the cold compress or bandage, which should be changed every five minutes where there is considerable redness. The redness is almost invariably accompanied by a rise of temperature of the part. This is also favorably influenced by the cold. When the redness and heat have disappeared, the cold application should be discontinued.

As to the relief of the swelling by cold, the effect is not secured so easily. Only in rare cases is it possible to prevent the swelling or to restrict it within certain areas, and it is almost impossible to reduce the swelling by this measure.

In the most severe cases only intense cold is able to alleviate the pain. In moderate cases, however, relief is secured by the simple cool bandage without resorting to continuous cold. In general, the more intense the pain in the acute stage, the more continuous should be the application of cold, and in proportion to the diminution of the severity of the pain should be that of the cold, both as to time and temperature.

We can thus see at what stage the application of heat should begin. By "heat" we understand not only those applications at room temperature, but also those which produce a heating of the joint either by their inherent degree of heat or by the accumulation of heat, however this may be produced.

We may next consider what may be expected from heat with

regard to the inflammation, swelling, and pain in the joint. In the subacute stage, where there is still a slight amount of redness which the cold seems unable to subdue, many cases will be very quickly cured by carefully graduated warm applications. It is always safe to avoid rapid changes from one extreme to another, and the transition should be gradual.

In some joints the process is very rapid, so that within a few days the measures for the accumulation of heat are indicated. This is easily attained by allowing the moist bandage to be left on each time a little longer before changing, or by covering the moist by a dry bandage, even by an impervious covering. In the latter case a bandage at the temperature of the room or below will be very quickly heated by heat accumulation. When we are certain that the heat accumulation is beneficial, we can begin the application of measures at higher temperatures, as a fomentation or local or full baths. These applications should also be carefully graduated, increasing them a degree a day, to five or six degrees above body temperature. Care must be taken in giving hot air baths, and it is best not to employ these in the subacute stage.

The hot applications stimulate the circulation, thus favoring absorption and repair, and reduce the swelling, whether due to fluid or cellular exudate. Heat is also beneficial in the subacute stage in overcoming the pain, not only because of its sedative effect upon the sensory nerves, but especially because of the improvement in the joint with the decrease in the swelling on pressure.

In the subacute stage, however, heat must be used as carefully as a two-edged sword, although in chronic cases it is the sovereign remedy. In the subacute stage the heat may not only prevent the subsidence of the condition, but is also likely to promote a powerful reaction which may be highly detrimental. In many cases the spark of inflammation which is lying dormant may be kindled into an acute condition by careless treatment which would increase the reaction.

In chronic cases it is often desirable to secure a certain amount of reaction, and the common belief that the pain which reappears in taking baths is a favorable symptom is not without foundation. The temperatures useful in chronic cases are 40°-41° C. (104°-105.8° F.) for full baths, and 45°-48° C. (113°-118.4° F.) for local baths, and still higher for hot air baths.

Cold is also useful in these chronic cases, and should follow the hot applications for the purpose of improving nervous and vascular tone, or as a hardening measure, to protect the sensitive rheumatic from sudden changes of weather.—Translated from *Blätter für klin. Hydrotherapie*.

TRANSLATIONS.

Concerning the "Wave Current," by Dr. H. Bordier. Translation from the Archives of Medical Electricity, February 25, 1908, p. 133.

Looking over the issue of the Archives of Medical Electricity of August 25th last, which I have only opened just now (October, 1907), I find an account of the voyage made by M. Gallot in America. M. Gallot saw applied over there a form of Franklinization called by the Americans, following Dr. W. Morton, the *wave current* and which latter seems to have greatly interested our electrical engineer.

"This wave current [says he] almost unknown here, is employed everywhere throughout the United States. . . . It is produced by a static machine, preferably a powerful one, whose negative pole is carried to the earth and whose positive pole is brought into direct local contact with the patient. . . . A spark gap arrangement placed on the machine short-circuits its two poles; the two balls of the spark gap are progressively separated and the sparks jump across between them while the patient, at the point of contact of the electrode, exhibits extensive contractions, the more extensive according as the spark is longer. These contractions are in no wise painful."

I feel impelled to make a few remarks on this claimed new form of Franklinization. It is now a long time that we ourselves have employed it in France, but under the name of *franklinisation with indirect sparks* (*franklinisation avec étincelles médiatees*).

"When we examine, in effect, the arrangement made use of, (Fig. 1) it is easy to recognize that the machine is so arranged that its two polar balls and its antennæ constitute an indirect exciter (un excitateur médiate). See H. Bordier, Précis d'électrothérapie, 2d edition, p. 156.) The patient, insulated, is connected to one of the poles of the static machine constituting a prolongation of the collector and raised to the same potential. The polar ball corresponding to this collector is itself at the same potential as would be the ball nearest the patient of any indirect exciter. The second polar ball being, in the arrangement of the wave current, connected to the ground the spark jumps between this ball and the first, just as that takes place between the two balls of an indirect exciter.

"Whatever may be the extent and the form of the contact with the patient, at each spark there is produced a contraction of the muscles, whose motor points are covered by the electrode, a contraction that we know since a long time to be less painful than that which accompanies a direct excitation. This result as regards pain is due especially to the density which is much less in the first case than in the second.

"If the number of sparks, and as a sequence the number of contractions, is very large in the unit of time the muscles enter into tetanic contractions.

"The wave current is, therefore, not a new form of Franklinization, since everything takes place exactly as it would take place if the sparks jumped between the two balls of an indirect exciter (the machine being arranged for simple Franklinization).

"For those physicians who do not possess an indirect exciter, the arrangement of the Americans, as indicated in Fig. 1, will

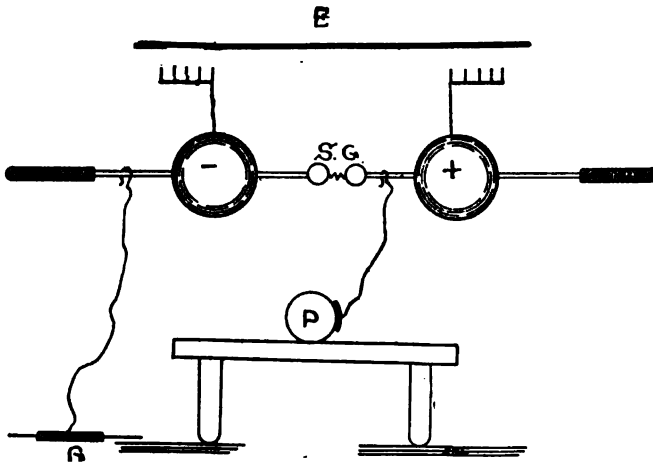


Fig. 1.—Wave Current of Prof. Morton.

1.—Insulating platform. P, patient; E, Electrode; G, Earth; S.G, Spark Gap.

enable them to dispense with the necessity of buying a new instrument. The correspondent of the Archives of Electricity has, therefore, rendered us still one more service and we should all render thanks for this to the eminent editor of this Journal, Professor Bergonié, who has initiated these interesting interviews with our American confrères.

"I might remark that the arrangement indicated has the advantage of not obliging the physician himself to hold the apparatus applied to the patient as is necessary with the excitateur médiat. This simplification of technique is well adapted to encourage those French medical electricians to make use of the médiat actions thus produced in such cases as were described to M. Gallot by Dr. William Benham Snow as follows: "The local action (Archiv. d'Electri. Méd., 1907, p. 637) is indicated by a profound massage and abundant sweat under the electrode. This massage, whose energy may be

regulated at will by the length of the spark gap, diminishes congestion." For external treatment, Dr. Snow employs electrodes in "block tin" molded to the part to be treated.

"A last observation is relative to the question of the pole to be connected to the ground. "It is of interest," says M. Gallot, "according to that which has been affirmed in America, to place the negative pole to the earth and the positive to the patient because that there would be four times as many oscillations (?) on the positive side with the negative to earth as would be the case vice versa." We do not well comprehend this explanation. I would prefer to invoke the experiments that we have made with an *excitateur médiat* (Archiv. d'Electri. Méd., 1894, p. 615) relative to the influence of the polar sign in *médiat* excitation. The muscular contraction is much stronger as our graphic representation indicated on page 617 of the Archives of 1894, when the ball of the exciter raised to the same potential as the body is positive, the other pole being negative in the contrary case. This predominance is an effect of polarity such as is also produced in the case of the galvanic current at closure."

M. Gallot was probably correct in his statement as to the unfamiliarity of some of the French confrères with the "static *wave current*." No better evidence of the fact is to be found than in Dr. Bordier's own effort to call "our electrical engineer" to task.

It is plainly evident from the perusal of the above translation that the writer is unfamiliar with that current when he compares it to the feeble current administered with his so-called "*excitateur médiat*," at best an inconvenient arrangement "for application to motor points to produce contraction of muscle." No operator familiar with the wave current, which requires no second apparatus as an "*excitateur médiat*," would make application to the motor points to induce muscular contraction. On the contrary, those familiar with the therapeutics of the static wave current apply a suitable metallic electrode over the site of non-infected inflammatory processes with a view to inducing not alone *muscular* contraction, but *tissue* contraction diffused throughout the involved area, and coincidentally another effect—a general diffusion of the current, to and fro, throughout the whole system from the electrode to every part of the surface of the patient, an effect impossible to produce with the attachment—the "*excitateur médiat*."

As to the statement attributed to M. Gallot that "at least four times the number of oscillations are induced by grounding

the negative instead of the positive," while correct, it does not recognize the chief reason for this arrangement. And Dr. Bordier has again shown his unwillingness to accord a better reason, or from his general unfamiliarity with the subject has failed to record the important reasons (1) for grounding either side and (2) for electing to ground the negative instead of the positive.

The editor has shown in his own work "Static Electricity and Uses of the X-ray," page 59, (1) the importance of a good grounding for the purpose of intensification, and the induction of profound contraction; (2) the maximum spark-gap possible to obtain when the negative is grounded being slightly longer than when the positive is grounded, the other condition being the same. (3) The election of the positive connection (negative ground) in the treatment of inflammatory conditions, when the effect "is more sedative and produces the more tonic effects—indications for the static *wave current* which are considerably more important than "a profound massage and sweat under the electrode," as stated by Dr. Bordier.

When our French confrère has become familiar with the static wave current as produced from a static machine, having a requisite capacity he will appreciate the weakness of his attitude and recognize differences not otherwise appreciated.

EDITOR.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

(Continued from page 332.)

CHAPTER IV. (Continued.)

SOURCES OF RADIANT ENERGY.

The bath cabinet shown in Fig. 14 is manufactured by Frank S. Betz of Chicago and has the advantage of a sliding table which permits the patient to be pushed into the bath and

withdrawn at the end of the treatment. The lights in this bath are arranged on all sides and beneath, the patient reclining upon the slatted sliding framework.

The *upright bath cabinet* shown in Fig. 15, are manufactured by the Kny-Sheerer Co. of New York, and are constructed

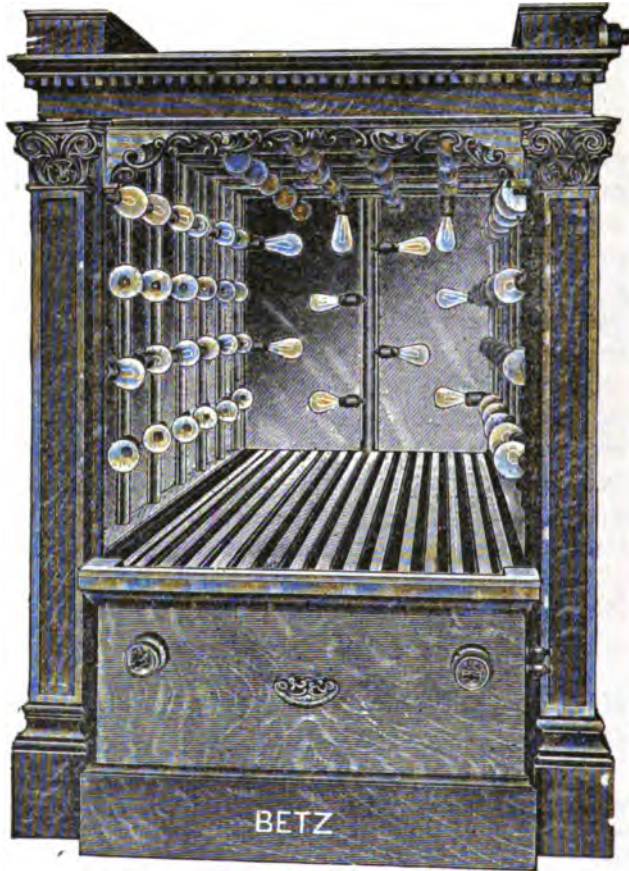


Fig. 14.—Betz reclining bath cabinet.

for giving the treatment in an upright position. The bath is provided with mirrors and a variety of colored bulbs, and is exquisite in its details of construction.

Another type of bath cabinet has been manufactured by Spear-Marshall Co. for the writer and consists of a portable collapsible box, the sides of which are made of three thicknesses of veneer, and finished within with white enamel. One

end is notched out for the head of the patient. Over the cabinet is fitted, when the patient is in position, a glass window. The object of this cabinet is to place it upon a long operating table and the cabinet placed over the patient. It is very con-

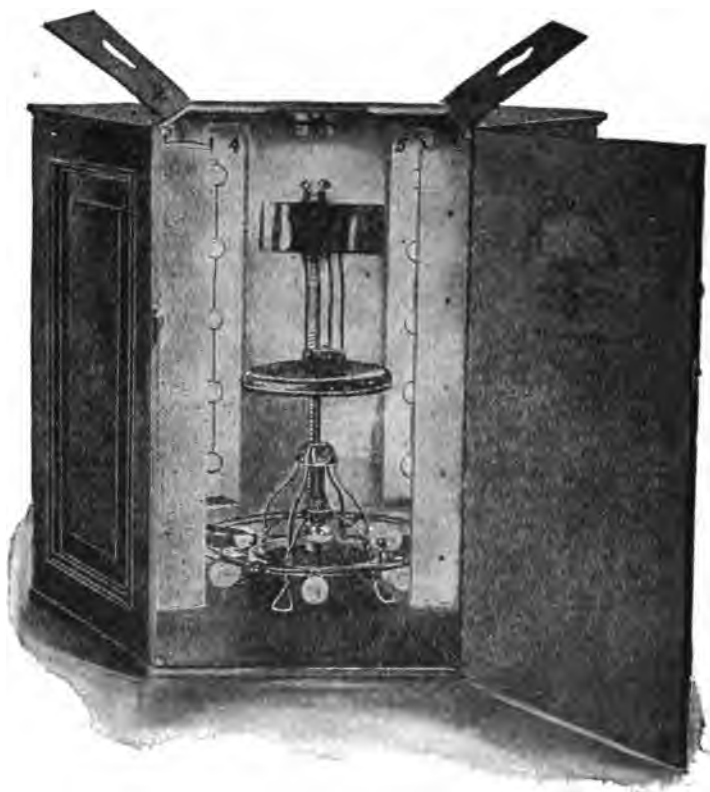


Fig. 15.—Kny-Sheerer upright bath cabinet.

venient for use when space is an element to be considered, and effective in administering combined radiant light and heat and convective heat baths by swinging the five hundred candle power lamp over the window of the cabinet.

*Medical School for Indian Women,
Ludhiana, India, February 18, 1908.*

Dear Doctor:—

I am sure you would have enjoyed seeing me at my work to-day, which was begun some time before 8 o'clock this a. m.

We treat the male patients first because the women will not come into the waiting room if there is a strange man. This morning we treated three male patients. One an old gentleman with paralysis agitans for whom the chance of improvement is small, though we spent an hour on him with the static brush and sparks, and mechanical vibration. Another case was of incipient phthisis, whom we are treating with the x-ray and static brush discharge. The third case was a native gentleman in the government service in Lanore, who was knocked down while walking at night, and run over by a four-wheeled carriage, and was insensible for hours after the accident. Strangely enough, there were no bones broken; but he was so severely bruised, that he was confined to his bed for more than a month, and is now at the end of his leave given him by the government, illy able to return to his work. I find a general sensitive condition on his whole right side, and am giving him the Morton wave current with large pliable electrodes over the right side of his trunk, and will later give him the brush discharge and the vibration as well as internal treatment.

A little later in the day, you would be pleased to see me carrying out an idea that had occurred to me to treat several patients at a time on the static machine. I am treating a number of eye cases, and found among those waiting several eyes to treat, and succeeded in treating four patients at once. There is very much leukoma here, and I am trying to see if I can possibly remove the spot from the eyes that prevents vision. I chose two of these patients to have the Morton wave current on the insulated platform, bandaging electrodes to the affected eyes, and connecting them to the static machine. I then took two cases of blepharitis that have resisted all treatment in use here, with the vacuum tubes. They were seated near the static machine with their bare feet near the stone floor. For the treatment of these four patients at one time, all connected to the positive side of the static machine, I began the treatment with a spark-gap adjusted to about $\frac{1}{2}$ inch, and as the patients could bear it, increased the spark-gap to an inch.

Among other cases treated, is a hopeless case of pannus. The patient is a fine intelligent boy of twelve years. One eye has been entirely destroyed by corneal ulcers; and the other eye is covered with a dense pannus through which he can only discern the outline of objects. I am now giving him the Morton wave current, and am also massaging the whole area near the eye, and also give the treatment from the vacuum tube five minutes daily. The conjunctiva that was dead in look has become loose and can now be pushed up in folds all around the cornea. What do you suggest? Do you think there is any hope? What else can I do for the eye?

The cure of enlarged spleens is now an assured fact. I have already treated twice the number that I had last year at this

time, as reported in the *JOURNAL OF ADVANCED THERAPEUTICS* for September, 1907, p. 461, and have not failed to help them all. Some would not stay until they were entirely well; but all who gave me time enough are entirely cured. I find that in recent cases where connective tissue has not formed, they are speedily cured; but in neglected cases of enlarged spleen, connective tissue has evidently formed. Those cases take from two to three months to be entirely cured. In cases where the patient has come within a few months of the time of the first enlargement, I can cure them in from ten days to a month's time. This is most encouraging, and cites me on to try what can be done for diseases that have not been treated in these ways. Another most interesting class of cases is that of adhesions of the pleura following pneumonia. Of these I have treated a few cases, and the relief has been most remarkable, and I believe is applicable to the treatment of these conditions in all countries, and will give most brilliant and satisfactory results. The Morton wave current was the measure used for the relief of pleuritic adhesions. I have also been successful in relieving adhesions of delicate muscles after injury, as of the palm of the hand. I have had several cases in which the fingers were drawn over so as to be flexed into the palm of the hand, and could only be opened far enough to push a thin piece of metal—the electrode—under the finger ends. This conditions yielded in a short time to the action of the wave current and gradually the hand is straightened out and becomes serviceable.

I am curing constipation with the vibrator alone. In cases of delayed menstruation I am getting a great reputation. In skin diseases I am doing more with the x-ray than with any other measure. I find that I can cure all the obstinate ulcers in a short time. The Oriental sores that as a rule have had to be treated for months with poor results, often without success, are cured in a short time before waste of tissue has resulted. These Oriental sores so often attack the face, so of course are most to be feared. I have had a number of cases of infantile paralysis. They have all been cured so far. Cases of facial or Bell's palsy have also yielded to the wave current treatment.

I should be glad often if I could have twenty minutes' talk with you about the treatment of perplexing cases.

Most truly and gratefully yours,

ALICE BRYAM CONDUCT.

With reference to the little boy with panus. I am afraid that this letter will not give you a chance to do for the boy what might prove of great benefit to him if you had a month or so to spare with him. I have full confidence that the x-ray

judiciously applied and watched will promote the absorption of nearly all of the scar tissue that is impairing his vision. I should use it according to the old rule, making the exposures for ten minutes on alternate days, persisting until the eye-lashes fall out and the skin of the lids began to show some redness. You will certainly succeed in improving his condition. After the first commencing dermatitis, I believe I would rest the treatment for a month or six weeks, and then resume. If you do this, kindly report to me some time in the future what your success is. He will not be the first case of pannus that has been relieved by the x-ray.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

A NEW BLOOD PRESSURE INDICATOR.

Designed by Louis Faugeres Bishop, M.D.

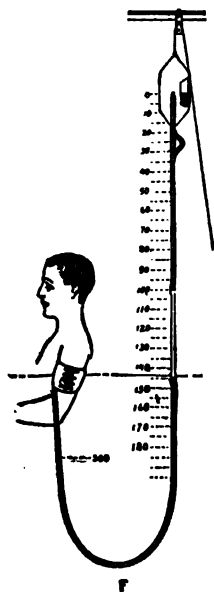
The cut shown herewith illustrates plainly the method of application and construction of this simple but effective apparatus for determining the blood pressure, the clinical importance of which is thoroughly established among thinking physicians.

The advantages of the apparatus are twofold: (1) It is accurate and operates on the familiar principle, that water pressure depends upon the height from which it flows. (2) It is convenient since it can be hung from the picture moulding, taking up little space and not requiring a table for its operation.

The apparatus consists of a red armlet 15 centimeters wide and 40 centimeters long and is made of strong material and differing from others of the Riva Rocci type in that it is wider and in the fact that the inclosed rubber bag occupies only a part instead of the whole circumference of the armlet. The advantage claimed for this is that the bag when expanded compresses the artery against the bone and does not surround the whole arm, which has proved to be painful. To this armlet or cuff is connected a tube 203 centimeters long, covered with a red material, to which in turn is connected a white covered tube 60 centimeters long and a blue covered tube and bag measuring 136 centimeters to the center of the bag. This bag is connected by a cord to a pulley constructed so that it can be easily attached at a suitable height for use. A special scale is attached

to the bag at the level of its contents to measure the height of the bag above the patient's heart.

The method of application is very simple. After the air has been removed from the bags about 12 ounces (360 cc.) of water are allowed to siphon into both bags. The ends of the tubes are joined, taking care to allow no air to enter. All the



Details of scale and tri-colored tubing.

water is run into the blue bag, which is allowed to rest on the floor, and the red armlet is fastened about the patient's arm, taking care that the part containing the rubber bag comes on the inside of the arm. The blue bag is then hoisted slowly until the pressure of the water that flows back into the cuff has sufficiently compressed the artery to obliterate the pulse at the wrist. To find the exact point at which the pulse ceases the bag is lowered until the pulse is distinctly felt again and then raised two inches at a time, counting ten beats of the pulse each time until it disappears. If at this point the white tube is opposite the level of the patient's heart, or the level of the cuff which is practically the same, the patient's blood pressure is within normal limits. If the blue tube is opposite this level the patient has a sub-normal pressure, and if the red tube, the patient has an increased pressure. All these readings are taken with the patient in a sitting position. The special scale attached to the apparatus is calibrated to measure the patient's blood pressure in terms of millimeters of mercury. When in

use the figures on the scale at the level of the heart, when the pulse disappears, indicate the blood pressure in millimeters of mercury.

The apparatus has been tested with all kinds of cases and compared with standard instruments and the readings found



G

Method of using detector.

correct. On account of the greater length of the scale and the absence of fluctuations closer readings are often possible with this instrument than with others, this being especially true in high pressure cases.

The apparatus is manufactured by E. B. Meyrowitz, 104 East 23d St., New York City.

The Journal of Advanced Therapeutics

VOL. XXVI.

AUGUST, 1908.

No. 8.

PRESENTATION OF A CASE OF LUPUS, SHOWING THE EFFECTS OF TREATMENT BY CONCENTRATED WHITE LIGHT.*

FELIX BARRETT, M.D., WESTBROOK, ME.

I regret that I have been unable to have the patient here to present her. I wish to give a brief history of the case and hope I may be able to get some light on the same. The case was one of lupus of the face. She has had it for seven years or more. September, 1904, began x-ray treatment with tube of low intensity, eight inches from the face, current from a 12-plate static machine, sitting, eight and ten minutes, two and sometimes three times a week. Case improved till April, 1905, when it became worse again, every x-ray treatment aggravated the condition. I then substituted the concentrated white light, from an 840 c.p. Nernst lamp, the treatments were from fifteen to thirty minutes, three times a week. The result was, that on July 1st we considered the case cured. On July 15th, however, her face and neck became poisoned by the brown-tail moth, which caused a severe relapse of all the old conditions. She is again improving under the white light.

Discussion.

Dr. Geyser: He used a tube that was of low intensity. It did not have much power of penetration. If he used it at a distance of eighteen inches, I fail to see how he could get anything except a stimulating effect upon the thing he was trying to destroy. Had he used it in direct contact with the tissues, it would have destroyed it, but if he uses a low power tube eighteen inches distant, that is the distance for a high tube. If I had wanted to spread that growth, that would be the means I would use. I have treated seven thousand cases with low tube in contact and I have yet to see the first x-ray burn.

* Read at the Eighteenth Annual Meeting of the American Electro-Therapeutic Association at Boston, September 18, 1907.

Dr. Pitcher: I would like to have Dr. Geyser state what kind of a tube he uses.

Dr. Geyser: I use a particular tube that was made for this very purpose.

Dr. Cannon: I wish to cite a case of lupus that came under my care three years ago. The patient, Mrs. B., æt. fifty-two years, was suffering from lupus as diagnosed by the late Dr. I. E. Atkinson, and others, of my city (Baltimore). The location of the lesions was as follows: Behind each ear, on the nose, and under the left eye and on either side of the chin.

She had been suffering for four years, and every attempt to ameliorate her condition had failed.

She came to me in July, 1903, and the following method of treatment was adopted:

The face and neck were covered by a piece of 22-gauge x-ray foil and of sufficient size as to protect the hair, eyebrows, etc. Apertures were made over and larger than the lesions. Owing to the distribution two rays were necessary. A medium tube, placed ten inches from the parts, was excited by a 12-plate Holtz machine, and the treatments given for ten minutes each every third day. During the intervals between the raying, the static brush discharge was used. I do not recollect how many treatments were given, but I do know I caused marked dermatitis inside of five weeks, and when this subsided, there were no traces of any of the lesions. This was three years ago and the patient to-day is perfectly well.

Dr. Doubleday: This is a paper which I am not prepared to discuss, but from personal experience with reference to that sort of treatment would state that I have used the x-ray by direct contact. I used the Cornell tube.



THE REMOVAL OF SUPERFLUOUS HAIR BY THE
X-RAY.*

BY F. A. BARDWELL, M.D., BOSTON, MASS.

In looking up the subject of the removal of superfluous hair by means of the x-ray, the investigator is early confronted with the fact that the records of the various cases reported are very deficient in the technical details involved in the treatment; in a few cases, however, some attempt is made to record in full the details of the operation, but even in such cases that which is omitted is of sufficient importance to render the whole report of little value to the earnest inquirer. This incompleteness in the matter of detail cannot be wholly ascribed to the neglect of the operator reporting the case, but is due rather to the lack of means to measure with accuracy and exactness the quality and quantity of the rays emitted by the tube and actually received by the plate or patient. Furthermore, the various forms of apparatus differ, one from another, to a sufficient extent to nullify the hope of closely duplicating with a given outfit the successful results obtained by the use of a different machine. And in addition, unknown conditions of tube must be taken into consideration and due allowance made.

Long and frequent exposures have been favored by some operators with the hope of securing quick and satisfactory results; but it has been my practice from the first to remain well within the limits of safety, and to prolong the intervals between treatments and exposures, as seemed best calculated to insure the desired outcome.

The removal of superfluous hair is generally supposed to be for cosmetic reasons only, but the possession of a beard or other obvious hirsute superfluity by one of the gentler sex, may have serious and more or less remote effects upon her nervous organism, and its removal sometimes renders justifiable the taking of certain risks and chances that a mere destruction of the growth might not warrant.

Before beginning treatments in such cases, it would be well to inform the patient, in the presence of a third party friendly to the operator, of the possible dangers incident to the use of

* Read before the New England Electro-Therapeutic Association, Boston, May 8, 1908.

the x-rays, in order that the risks involved may be fully understood. In their anxiety to be cured patients seldom hesitate to consent to submit without reserve.

Few rules of procedure in giving treatments can be offered. In general it is advisable to use a "soft" or "medium soft" tube, feeling your way along till you have learned the peculiarities of your outfit; a lead glass shield for the tube, or a lead glass tube makes it easier to watch the condition of the tube, while at the same time protecting the patient and operator; a number of thicknesses of tin-foil held together with surgeon's plaster, and provided with suitable holes, makes a convenient and easily adjusted shield to place in contact with the skin.

The following report of four cases will illustrate the methods pursued, and may suggest modifications for future treatments.

Case I. Mrs. S., age fifty-three. Chin well covered with stiff black hair one-half to three-quarters of an inch in length. The chin was well pitted with white scars resulting from the improper use of the electric needle. A large coil, "soft" tube and mechanical interrupter were used, the tube being held within two or three inches of the face. Exposures were given every second day for seven minutes; after seven treatments the skin became somewhat reddened, feeling warm and stiff to the patient; treatment was then discontinued for a period of three weeks, after which time, the skin appearing nearly normal, the treatments were resumed at the rate of two per week until a total of twenty-three exposures had been given and the case pronounced cured. At this time the skin was quite browned and thickened, and had much the feel of wet sole-leather. The patient was told that this condition would disappear after two or three months.

Case II. Miss S. G., age twenty-three; Italian by birth. Face well covered with a growth of curly black hair; hair in front of the ears from one and one-half to two inches in length; a shield for treating the cheeks was made with openings 2 1-2 x 1 1-2 inches in size; these seemed to expose the surfaces requiring treatment; the upper lip and chin were treated together—the lips being protected by tin-foil. After twenty-nine exposures the beard was removed from the cheeks, but either from stimulation or by contrast with the smooth skin, the hairy surface looked worse than before, and it was evident that a second course of treatment was indicated on the remaining

portions of the cheeks. Before the case was finished forty-seven treatments were given. From the fact that three or four separate exposures were necessary at each treatment, the length of each exposure was made four minutes; this short exposure caused only a slight redness, making it possible to continue the treatments without interruption.

Case III. Miss V. L., age thirty-six; Italian. The growth of hair in this case was not very noticeable, but the patient insisted upon its removal. It was decided that the x-ray treatment was to be preferred to the electric needle. A 24-plate static machine and "soft" tube were used, and twenty-seven treatments were given; the few coarse hairs still remaining was later removed by the electric needle. Three exposures or surfaces were treated at each sitting for a period of seven minutes each. There was some redness and browning of the skin but it passed off in about a month.

Case V. Mrs. M., age fifty-one; American. Coarse, heavy hair on chin. It was a question between the needle and the x-ray. The patient having a rather nervous temperament decided in favor of the x-ray, and, being anxious for early results, applied a stiff paste, quite similar to sealing wax, to the affected parts; this paste was applied warm in order that it might adhere to the hairs, and when cooled was stripped off taking the hair, roots and all, leaving the face temporarily smooth but at the expense of some pain. The x-ray treatment followed immediately, and two exposures per week were given; at the end of five weeks the hair had returned and looked as badly as ever; the x-ray treatment was then given independently, the paste being omitted, the hair commencing to come out after thirty treatments upon washing the face. Forty treatments were given and the case was pronounced cured.

When the foregoing cases were discharged the patients were told that the growth might return, but that a few treatments only would be required to remove it.

Not one of the four returned but I have been able to keep track of two of them—one treated two years ago, and one treated last year; in neither case has the growth of hair returned.

THE TREATMENT OF VARIOUS CONDITIONS WITH STATIC ELECTRICITY AND HIGH POTENTIAL CURRENTS.*

BY T. HARRIS CANNON, M.D., BALTIMORE, MD.

In presenting this paper for your consideration, I do so, not with the idea of suggesting any radical changes in our present methods of treatment, but simply to recall some of the excellent results we are obtaining in the common conditions or diseases generally met with.

In the perusal of the literature devoted to our branch of medical practice, or more specifically to electrotherapy, our attention is at once attracted to the fact that most all of the articles that appear therein deal more with the scientific side of the art rather than the practical. This I think is wrong, not that articles of a scientific nature are not interesting or instructive, but because so many of the medical profession who are just awaking to the fact that electrotherapy is a valuable adjunct in our treatment of various conditions, and even far superior to methods now generally recognized, fail, when looking over our journals, to find any reference to the treatment of conditions that can be readily applied by anyone with a good set of apparatus and the proper technic. I will admit that there are a great many text-books devoted to this branch of practice which will greatly enlighten them by a careful study of the same; but we all know that it is impossible for any book, unless reprinted several times a year, to keep pace with the enormous strides that we are making. Text-books, therefore, while absolutely essential, demand careful study by all who are interested in the subject, and should not be ignored, but their value enhanced by accurate, detailed reports of cases, by all of us who are engaged in this branch of practice.

I think it is our duty as members of this Association to report those cases in which we have secured such beneficial results, so that our journals will contain both the scientific and the practical side of the question, thereby enabling all of us to profit by the experience of each member individually.

* Read at the Eighteenth Annual Meeting of the American Electro-Therapeutic Association, September 15, 1908.

To many of you here this may seem entirely unnecessary, and it is only for those who have not had the opportunity to increase their knowledge by association with practical workers that I make this urgent request.

The apparatus that I used in my treatment of the conditions to follow is a 12-plate static machine, made by Van Houten & Ten Broeck Co., an inducto-resonator and a De Kraft auto-condensation couch made by the same firm, therefore all references to connections will apply to this type of apparatus.

The first condition that I desire to present to your notice, and which has been treated with such excellent results, is that of *anal fissure*. In all, thirteen cases were treated. In each of my cases the physical signs were positive and the fissures were seen in various stages. In the earlier cases the local inflammation was quite marked, while in some of the more chronic cases, ulcers of various sizes were to be seen. In all but one case there were external piles present, with excoriation of the buttocks, and pruritus in all of the cases. In only one case was the true cause of the fissure discovered; and this was the one in which there were no external hemorrhoids. By careful inquiry I learned that this patient was using a fountain syringe daily to move her bowels, and that five days before coming to me she had purchased a new syringe which scratched her when she attempted to withdraw the nozzle. Next day she noted marked discomfort when she again attempted to use the syringe, and the pain attending the expulsion of the scybalous masses persisted for an hour after defecation. This condition persisted for five days when she applied for treatment. She now complained of excruciating pain after defecation, in fact it was so severe that she had endeavored to prevent her bowels from moving. She was in a highly nervous condition when she called. Her abdomen was distended, and urination painful and frequent, and there was marked pruritus.

I immediately endeavored to move her bowels with castor-oil enemas, and relieve the pruritus with antipruritic remedies, and the pain with morphine suppositories, all without avail. Two days later I applied a ten per cent. solution of cocaine through a small glass syringe, and half an hour later attempted a divulsion. This was painful and gave practically no relief. As any suggestion of operative procedure was refused, I advised the use of the electrical currents. This suggestion was

accepted and treatments given twice daily for two days, and afterwards every day for a week.

The method of treatment was as follows: An insulated glass vacuum electrode was passed through the sphincter, which had previously been cocaineized with a four per cent. solution of cocaine, and, with the patient lying on a metal operating table, a wire was connected to the vacuum tube from the Oudin resonator, the negative pole (Tesla) being grounded. Treatments lasted for twenty minutes, except on one occasion when rectal irritability ensued.

Relief was marked after the first three treatments, and at the end of a week there was absolutely no sign of the condition nor was there any discomfort. This was over a year ago and to-day the patient has never experienced the slightest discomfort. All the rest of the cases were somewhat similar to the above, and while some were chronic, yet all got well, and in no case was treatment carried out longer than two weeks.

Tubercular glands of the neck.—Sixteen cases of tubercular glands were treated, and as in the previous condition, I will cite an illustrative case.

Mrs. F. S., æt. twenty years; was married but had no children; she weighed ninety-eight pounds.

Her family history was negative as regards tuberculosis or syphilis. In fact her grandparents are still living and in good health. Her mother and father also living and in good health.

Past history.—She has always been very slender and pale but never had any severe or prolonged illness. She has had all of the usual diseases incident to childhood, but completely recovered from each. About two years ago the patient noticed that her collars were getting tight and that movement of her neck was painful in certain directions. Shortly after this localized swelling along the cervical gland was noticed, and the pain now extended down to the shoulder and axillary space. At this time she consulted her family physician, who prescribed syr. ferri iodid and painted her neck with tinct. iodine. General tonic treatment was adopted and fresh air and sunshine advocated.

In spite of all his efforts, the glands continued to increase in size, and to such a marked extent that later movement of her jaws was limited.

When she presented herself for treatment it was impossible

for her to separate her teeth far enough to permit a tongue depressor to be used. There was no dental caries as she had had all her teeth examined by her dentist, nor were there any throat symptoms.

There were two broken-down glands, one on each side which were opened by an incision about one-half inch long and the cavity curetted and packed with iodoform gauze. The Oudin current was applied through a glass vacuum surface electrode to both sides of the neck with a spark-gap in the resonator of an inch and a half, which was continued until there was marked reddening of the skin. This was employed daily, with the exception of a few days, when the skin was too irritable, for one month, when all of the glands had disappeared. The patient was able to open her mouth widely and without any inconvenience to her. It has now been fourteen months since treatment was discontinued and there has been no recurrence.

Of the sixteen cases treated, twelve received the electric treatment only. Four of them had some softening which called for drainage and curettage.

Cystic tumor of the breast.—Miss E. R., æt. twenty-nine years, single, had no specific family history. Her parents are living and in excellent health. She has never had any severe illness. The present illness began three months ago, when the patient noticed a pain whenever she raised her arm, as in combing her hair, and a week later she noticed a swelling in her right breast, which was somewhat tender on pressure. At that time she thought that it was possibly due to menstruation, as there had always been some degree of tenderness of the breasts at that time. The patient consulted me on April 24, 1906, and gave the above history. The swelling of the breast was apparent with even a superficial examination. On May 10, 1906, active treatment was begun with the high frequency, high potential currents and administered every other day for three weeks, at the end of which time there was no tenderness and swelling and both breasts appeared to be of the same size.

The method of procedure was as follows: The first treatment consisted of the application of the Oudin current with a glass vacuum surface electrode (the negative side of the machine grounded) for twenty minutes, with a spark-gap of one to one and a half inches in the resonator. The second treatment, and each alternating treatment, was as follows: A

grounded metal plate was applied to the back of the patient, the negative side of the resonator was grounded, and a brush electrode was attached to the top of an Oudin resonator and held far enough away from the breast to prevent the passage of sparks, which are very painful owing to the marked contractions they produce. In this instance a spark-gap of from three-quarters of an inch to one inch was employed.

Arthritis deformans.—Thus far I have only had the pleasure of using the electrical modalities in one case of arthritis deformans, and while I am pleased to report much progress, I am not yet in a position to state that the disease is curable by electrical treatment. The history of the case is as follows: Miss H. S., æt. fifty-two years, is single and gives negative family history as regards malignancy, tubercular conditions, rheumatism, etc. Her past history gives nothing as regards the present trouble. She came to me last October with the following history: Nine years ago the patient noticed pain in wrists and hands which was worse at night and which prevented her from sleeping. Her general health at this time was unusually good. There were no rheumatic symptoms.

Several months later, her knees, ankles, and feet became involved, which prevented her from walking. During this time she received very active treatment, but without result. One year since the onset, she noted the deformity of her hands and toes, and ankylosis of the kness which increased in severity. For the past four years she has practically been helpless and a nervous wreck, and her pains have been so severe that she would be suddenly awakened, when she would scream with pain. She had to be carried to my office for treatment, which consisted of the application of the d'Arsonval current to the painful, distorted joints until marked reaction occurred, then the wave current was employed until the inflammation or irritation due to the d'Arsonval had subsided. The Leucodescent 500 candle-power lamp was used after each treatment.

In applying the d'Arsonval current I made use of the method so ably described by Dr. De Kraft in his paper read before this Association last year, and which was as follows: The negative pole of the d'Arsonval was grounded, and a glass vacuum tube connected to the positive pole. Then a grounded piece of tin-foil was applied to the opposite side of the joint and the current (150-200 ma.) allowed to pass through the joint for at

least ten minutes. This soon produced a redness and tenderness of the skin, and the after-effects were described as though she could feel needles passing through the joint.

After treatment as outlined above, the patient noticed a marked diminution of her pain and her nervousness, and said that her appetite, sleep, and general muscular control had very much improved. Owing to her long period of inactivity she found it impossible to use her fingers, as in holding a pencil, needle, or in hooking her dress, etc. To overcome this, I advised her to get a pine board, tacks, and a hammer and to practice driving the tacks into the board. At first this proved rather painful, but after persistent effort she became able to drive the tacks pretty well into the board. To aid her in her efforts to walk, I made her step over a brick or a cigar box several times a day. These exercises, while extremely simple, seemed to give her more control over her muscles. Owing to the rather inclement weather she did not get her treatments with any regularity, but nevertheless improvement continued until an accident befell her on June 1st, when her nurse accidentally struck her crutch with her foot, thus causing her to lose her balance and fall heavily to the floor, getting a severe contusion of the right hip. This confined her to her bed for two weeks, and to her room for a week longer. After this treatments were again taken with immediate improvement. After taking ten treatments she left for Atlantic City, where she is at the present time. I learn from her sister that she is not doing so well and that she desires to resume treatment upon her return to the city.

I report this case, not with the intention of claiming a cure, but simply to cite the fact that even in the most presupposed incurable cases we are able to at least give relief, where every known method had failed.

Periostitis.—Miss E. M., æt. thirty-two, single, school-teacher, presented herself for treatment last November. From her history and careful inquiry I found that she was suffering from periostitis of the left tibia. She had been under treatment by several surgeons in this city for three years, but had never obtained any appreciable benefit. All three had advised an operation, but she absolutely refused to allow any surgical measures to be taken.

When she came to me, I immediately placed her under the

influence of the d'Arsonval current as outlined above and continued this for a week, giving treatments thrice weekly. The next two weeks the Oudin current was employed with an ordinary surface electrode. Improvement was soon noticeable, as manifested by the fact that she could take longer walks, could stand longer on the limb and the relief from the pain which had previously been quite severe. Treatments were given for from fifteen to twenty minutes each. There is now practically no pain, although the patient is on her feet more than ever and can take longer walks without any after-effects.

To attempt to report all of the common conditions that are amenable to this method of treatment would consume too much time. I will therefore only add that the following conditions have all yielded with equal promptness as have the conditions reported. They are sciatica, sprains, arthritis, rheumatism, severe ulceration and sloughing of the gums, torticollis, alveolar abscess, and varicose ulcers.

In conclusion, let me ask that each of you favor me with some suggestions as to improvement in my technic, as I realize that it is only by such discussion that we are enabled to select the best mode of procedure in the treatment of our future cases.

401 N. Fulton Street.

Discussion.

Dr. Torbett: I have been much interested in Dr. Cannon's paper because it is intensely practical, giving the conditions treated and the exact electrical methods used to cure them. It shows what a large number of diseases can be relieved or benefited by the various electric modalities. I was especially interested in his case of arthritis deformans, called also in the old classification rheumatoid arthritis, as I have seen and prescribed for about one hundred and fifty such cases during the last six years, almost all of which had been diagnosed and treated as rheumatism with the salicylates, until their stomachs were frequently ruined.

I use the term general atrophic arthritis to designate those cases that usually have symmetrical invasion of the joints which become spindle-shaped and deflected, with increased pulse rate, etc., as described so well by McRea in his article before the

American Medical Association three years ago, in which he reported one hundred and ten cases.

I have used every method of treatment on those cases of which I ever read or thought would be of benefit, including the x-ray and all the electric modalities except the d'Arsonval current as used by Dr. Cannon. I have derived the greatest benefits in an electrical way from the high-potential currents from the Oudin resonator and a twelve-inch coil, using the glass vacuum electrodes to the parts affected when very acutely inflamed; always following with the static insulation for its tonic effects.

The more chronic cases, however, were best relieved by the wave current, using a pad or roller over the naked joints affected. Many of my cases had been confined to a rolling chair for some time, and, while not cured entirely so far as stiffness is concerned, have been freed from pain and soreness, and enabled to walk with comparative comfort. A large number of my cases were visitors from remote parts of the state and could not remain for electrical treatments, for financial reasons. To those patients I gave the Balfour treatment, i. e., the syrup of the iodide of iron for three weeks in large doses, one-half to one dram, alternated with Fowler's solution of arsenic for one week, kept up almost continuously for several months. No improvement is noticed, frequently for one month, after which rapid results are often obtained from this alone. I would urge the members of this Association not to be lured into the habit of using the valuable modern physico-electrical methods alone, but to combine deep breathing, fresh air, forced and concentrated nourishment including meats, together with the medical treatment, if they would get the best results in all such cases.

Dr. Brockbank: The doctor spoke of grounding the negative side of the oscillated current. He means, I suppose, to say he grounded one side.

Dr. De Kraft: I think that it is unimportant whether we employ metallic or glass vacuum electrodes when using high frequency currents. It seems to me doubtful if the luminous effect of glass vacuum electrodes have more than surface effect.

To employ the wave current on a part when we have used the d'Arsonval current does not seem to me to be rational, for

when the d'Arsonval current is used for its local effects, we induce an intense hyperemia, superficial as well as deep, of the part, which is followed by a decided increase in the temperature of the part to which the current is applied. The local effect of the wave current is almost the very opposite.

Dr. Gibson: I wish to mention in particular a case which came to me of a woman who had not walked in years. She had not written a letter in over three years and her husband carried her into the room. Every joint in her body was deformed. I put that patient on the stool and commenced treating the ankles. Finally I had her stand up, giving her a stick or something. I continued treating the ankles and applied all of the first treatment on her feet. When I got through with the treatment, she got up with my assistance, and began walking around the room and out into the hall, then out to the corner and walked six blocks to the hotel, the first time in years. That, with the static spark applied in almost a chronic case. She went to housekeeping in two months and is doing her work. She was not absolutely and positively cured, but she was relieved to such an extent that she could get ahead with her housework.

Dr. Brockbank: With reference to the remark of Dr. De Kraft, I understood him to state that the output of light from the vacuum tube had no effect at all. I believe the chemical action of the violet light that we get from the vacuum tube is driven into the tissues and there transformed into an energy that stimulates and helps those conditions very materially, and I believe that the effect is probably due as much to chemical light as to the rapid driving of the electrical current through the glands.



Editorial.

LIMITATIONS OF THE VIS MEDICATRIX NATURÆ.

THE *vis medicatrix naturæ*, Nature's inherent power to cure disease, has been the main prop and support of the medical profession throughout the ages; and by the capacities of Nature to repair and compensate for the various disturbances of the organism, life is prolonged indefinitely; and in most instances, to this power is largely due the recovery, partial or complete, from pathological conditions, when no other agency is employed; and very much of the good doctor's credit in the treatment of his patients is attributable to Nature's own resourcefulness.

The scientific physician fully appreciates the fact that his main function in the treatment of disease lies in aiding or directing the workings of the inherent properties of the *vis medicatrix naturæ*, and some have so much faith in Nature's powers to overcome most conditions of disease, that there is a tendency by many to rely upon suggestive therapeutics in connection with the regulation of habits and environment, to the exclusion of other treatment. For such as the faith healers and Christian scientists, who from their prejudiced notions rely upon suggestion under other guises there may be some excuse; but for the progressive neurologist or the general practitioner to rely upon suggestion, is to ignore physical measures, which afford ample means of effecting cures, when Nature unaided fails to obtain equally good results. In these contrasts are abundant evidence of the limitation of the *vis medicatrix naturæ*.

Probably no one condition forms so often an obstacle to the natural curative forces as *local stasis*. The tissues surprised by local shock or injury are stimulated to an influx of blood into the region injured through the afferent channels, greater than the efferent are capable of removing when pressure is established by the accumulated fluids, and the efferent channels are shortly completely occluded. When this condition has once intervened, Nature unaided is incapable of overcoming, except in the mildest cases, the obstruction, and a chronic condition of stasis with a region of pain or tenderness with inhibition is

established. In a chronic inflammation an indurated region of stasis will be found present to a greater or less extent in all cases, evidencing the inefficiency of the inherent powers to overcome obstructions thus established. This obstruction to recovery can be readily overcome, in all but infected cases, by an active agency, which will induce activity in the tissues of the regions of involved stasis.

Besides the conditions of simple inflammation, whenever infection has involved a part or region of the organism, Nature, under a requisite extrinsic stimulation, is able to increase the local activity of her own scavengers—the phagocytes. By the induction of an active arterial hyperemia, thereby increasing the number of phagocytes in a region of streptococcic or staphylococcic infection, it is possible to completely eradicate the germs in the early stages of such process, thereby preventing a farther development of the disturbing element. An abscess, boil, or carbuncle, left to Nature, follows the inevitable course of suppuration; whereas the energetic employment of radiant light and heat, convective heat, or the high frequency currents, inducing active arterial hyperemia, in the involved area, not only inhibit the activity of the germs present, but increase, relative to the hyperemia induced, the presence and activity of the phagocytes in the field of infection; and the infectious process is aborted. In the light of these facts, it is folly to rely upon Nature alone,—the unaided workings of the *vis medicatrix naturæ*.

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MEETING OF THE COMMITTEE OF CHAIRMEN.

AS announced by the Secretary below, a meeting of the Chairmen of the Special Committees of the American Electro-Therapeutic Association was held pursuant to the resolution passed at the last annual meeting. For a first meeting in the progress of a new movement the meeting was eminently successful.

The object of the meeting and the work intended to be done by the committees had not been generally grasped; some looking upon the plan as designed to bring out and develop only newer methods; whereas the object is to bring into concrete

form all of the *physiological actions* and *therapeutic indications* of each modality and their *relative merits* with the *reasons why*.

A careful consideration of this great subject with discussions *pro* and *con*, and final adoption by the Association in session, will introduce a set of rules or laws to govern the therapeutic employment of physical measures.

The earnestness and thoroughness with which this important work is taken up by the membership, particularly the preparation by the Committees, who have the preliminary work in hand, will determine its value.

A full report of the recent meeting of the Chairmen of Committees will be found in the closing pages of this issue of the Journal.

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SECRETARY'S ANNOUNCEMENT.

TO the Members of the Electro-Therapeutic Association.

The President, Dr. Pitcher, called a meeting of the chairmen of the various committees to meet in New York on the 13th of June.

The response was more than expected; practically every committee was represented, and the reports showed that an unusual interest is being manifested in the work.

Dr. E. C. Titus, Chairman of the Committee on Arrangements, reported that the next Annual Meeting would be held on the third Tuesday, Wednesday, and Thursday of September, 1908, in the Electrical Engineers Building at No. 29 West Thirty-ninth Street, New York.

Dr. Snow, Chairman of the Committee on Exhibit, reported that from the present indication the exhibit would surpass anything yet seen at one of our annual meetings.

No matter how hard the committees may work they cannot make this meeting a success without the individual assistance of all. Let all who can prepare a paper for the meeting and send an abstract to the Secretary at an early date.

ALBERT C. GEYSER, Secretary.

Progress in Physical Therapeutics.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

Diseases of the Heart and their Treatment: a Synopsis. By Otto Lerch, A.M., M.D., PH.D., American Medicine, August 12, 1905.

"Lerch says life of the human organism depends largely upon the equilibrium existing between arterial and venous pressure; if this is perfect, nutrition is perfect and all waste is readily removed. The direct and final cause is always the same, a weakening of the heart muscle, a breaking down of the heart, due, it may be, to a valvular lesion or an obstruction in the pulmonary or systemic circulation. The heart answers the demand for more work with hypertrophy, and as this can be carried only to a certain point, a time comes when a slight exertion causes the compensation to break. Shortness of breath and palpitation are generally first noticed; the blood is poorly aerated in the congested and changed capillaries of the lungs; the alveoli are torn by the engorged vessels and damaged and encroached upon by intestinal tissue growth. The face becomes cyanotic, and blueness of the lips and finger-tips marked. The pulse, formerly feeble, becomes irregular and palpitations are more frequent, due to frantic efforts of the heart to empty its chambers. Perspiration is increased, and in contradistinction to the suddenly developed overaction of the skin, the urine is diminished in quantity, is of high specific gravity, highly colored, and contains a sediment and albumin, the typical urine of stasis.

Hypertrophy of the right ventricle, with subsequent dilatation, is found when the obstruction exists in the pulmonary circulation—deformities of the chest, emphysema, thickened pleura, interstitial pneumonia.

The heart of the obese, the "fat heart," is weakened by layers of fat deposited upon it and in its muscular tissue. We find the muscular fiber degenerated in only the most advanced cases which is, however, the end in all cases of heart disease.

Hypertrophy may take place without a previous dilatation; muscular growth depends here, as elsewhere in the body, upon improved nutrition.

Dilatation is a symptom of heart weakness and may also occur in valvular lesions before compensation is fully established or in myocarditis or sclerosis of the coronary arteries.

Valvular lesions are always due to an endocarditis, the inflammatory process causing a growing together of the valves, creating an obstruction or their shrinkage; and insufficiency, articular rheumatism, and any of the infectious diseases, especially pneumonia, as well as arteriosclerosis, may cause it.

For proper treatment, we must know the cause of the disease and determine the changes that have been produced in the various organs and tissues. If the compensation is broken, it must be our aim to reestablish it; if it is still intact, to preserve it. We have to strengthen the heart muscle, cause compensatory hypertrophy, and reduce an existing dilatation. Thereby we will establish an equilibrium between the venous and arterial circulation, necessary to health and life. To accomplish this object we have to reduce the fluids of the body, relieve the pulmonary and kidney circulations and improve the blood.

The organism will stand higher temperatures in the hot-air bath, as the evaporation of the continuous perspiration will cool the body surface and the dry air will rapidly absorb moisture. Heart strength has to guide the therapist in the selection of a suitable method. Patients with a completely broken compensation need rest and drug treatment, to which one or the other of the foregoing methods must serve as an adjuvant. To regulate the diet in each particular case we must not lose sight of the end to be accomplished, "to reestablish or keep the compensation and to strengthen the heart muscle."

The soft, firm stroke of massage, directed from periphery to center, will empty the superficial veins and lymphatics and facilitate the flow of blood in the arteries.

The deep breathing, imitating the heart's contraction, will do the same for the deeper vessels, and the rapid muscle beating combined with passive and active movements, causing muscular contraction, will have a similar effect in pushing the venous blood into the right heart. Tapotement between the shoulder blades and vibration along the spine will frequently slow the pulse—the digitalis of the masseur. Walking and climbing act especially upon the large veins. Deep inspirations cause suction, and the use of a stick, contraction of muscle. Climbing forces deep inspiration. Arterial pressure rises, due to a more rapid flow of venous blood into the arteries, which lose their tone; the full and soft pulse indicates the equilibrium of the circulation, and the thermometer shows greater heat loss.

Increased heart force, lessened peripheral resistance, greater blood flow, are conditions to produce increased nutrition. The loss of water, by way of lungs and skin, moderates the increased blood-pressure.

Muscular movements stimulate the heart. Walking and climbing are superior to all other exercises. Together, they form the best method to strengthen the heart; its contractions become stronger; the arteries dilate and nutrition improves,

causing muscular hypertrophy, and its dilated chambers return to their normal size, or as near to it as the pathologic condition will permit.

Gymnastics, with or without apparatus; massage, Swedish movements; passive and active movements, with and without resistance, and outdoor work, are all therapeutic means to be used with the same object in view, to dilate the capillaries, to remove peripheral resistance, to cause a better filling of the arteries, to deplete the veins, to cause stronger heart contractions and an improved nutrition of muscles. Prolonged rest and milk diet are injurious in heart disease.

Massage of the heart, as designed by Oertel, is useful. The patient is directed to take a deep inspiration, which causes a negative pressure within the chest, and to divide the expiration in two portions, exercising pressure upon the heart, of which the second is especially strong. The effect can be further enhanced by manual pressure upon the chest walls. The physician applies both hands in the axillary lines, about on a level with the fifth rib, upon the chest wall, and in a semi-circle, with the beginning of the respiration, allows them to glide downward toward the ensiform cartilage, increasing gently but firmly the continuous pressure. As soon as the hands reach the middle line pressure is made with the thumbs, moving them outward to the right and left, preventing an outward movement of the frontal thoracic walls. At the end of the inspiration the hands are again applied firmly and the process is repeated. This direct massage of the heart removes a larger amount of air from the lungs than during ordinary or simple deep breathing, adding the advantages of massage to the heart muscle.

The application of hydro-therapeutic measures needs consideration.

"The heart can be directly influenced by cold and hot applications, and clinical experience has shown that after suitable hydriatic measures, dilated hearts decrease in size and show improved functioning. Cold applications slow the pulse and hot applications increase its frequency. A cold bath increases blood-pressure and a warm bath diminishes it. The heart answers promptly the demand for greater work and the hyperemia of the skin following the cold bath means improved circulation. During a cold application the capillaries contract and blood is driven into the interior arteries and the work of both ventricles is increased. The reaction that follows the application dilates the capillaries and the blood rushes into these vessels; the skin shows a healthy glow and an agreeable sensation of warmth is felt. The work of the heart is eased, but the stimulus it has received is lasting and the improved nutrition is a permanent gain.

It can be seen, however, that this powerful method has to

be used with caution, as, immediately following the application, the heart is taxed and has to call up its reserve force to overcome the obstruction. In patients who have lost this force to a large extent and in those who react poorly, in those affected with advanced nephritis and in the sufferers from arteriosclerosis, this form of bath is contraindicated. After a cold application it is absolutely necessary to follow with vigorous friction and not stop till a good reaction has been produced. By proceeding slowly and cautiously, and by administering a warm bath before making the cold application, we can lessen the taxing effect upon the heart to a large extent. The ice-bag and local applications may be used frequently when it would be dangerous to use the cold bath or douche.

The warm bath, the steam bath, and the hot air bath cause dilatation of the peripheral vessels. The pulse tension and blood-pressure fall and the number of heart contractions increase. A large blood stream is directed toward the periphery, relieving the congestion of all internal organs. The peripheral resistance is decreased and the heart work lessened. The increase of pulse frequency is due to reflex action of the sensory nerves of the skin. The volume of the extremities remains increased, and that of the waste measure decreased for several hours after the bath, due to the large amount of blood and lymph drawn from the organs into the peripheral vessels. A caution is here also necessary—weakened hearts, with advanced dilatation will not stand vigorous measures. The effect of the hot-water bath, steam and hot-air bath for the purpose of removing rapidly a large quantity of water from the body, if ingestion of liquids is limited, has been mentioned.

We can increase the action of water upon the sensory nerves by adding irritating substances, and a number of mineral springs, containing sodium chlorid and calcium chlorid and iron salts, have become famous in the treatment of diseases of the heart. The waters at Nauheim, containing carbonic acid, were employed with advantage in the treatment of articular rheumatism, with endocarditis, in 1872, by Beneke, and others followed, but their general application is heart disease, and their present popularity they owe largely to the labors of the Schott brothers of that place; so much that by the laity the waters are frequently regarded as specific. Like in the mineral bath, the thermic and mechanical effect is increased by the irritating influence of the carbon dioxid they contain, and the constantly forming and escaping gas bubbles cause a continuous change of dilatation and contraction of the peripheral capillaries, which means a massage of vessel walls and functional activity of the heart. The bath usually lessens blood-pressure and increases pulse frequency.

The bath may be given at home. Compressed carbon dioxid can only be used with expensive apparatus. In private prac-

tice, the gas is best developed in the tub, about one part by weight of carbon dioxide to one and a half parts of commercial hydrochloric acid, which allows an excess of the acid. If equal parts are taken, as is often the case, alkali is in excess. One kilogram of sodium bicarbonate and one and a half kilograms of commercial hydrochloric acid to 250 pounds of water, corresponds to a strong Nauheim bath. It is wise to commence slowly, perhaps with a tenth, and to increase with the progress made.

To prepare the bath, the salt is dissolved in the water, and the acid, contained in a long-necked bottle, allowed slowly to escape by moving the same, neck downward, under the water, avoiding too great motion of the water. If it is desirable to make the artificial bath similar to those of Nauheim, salt containing sodium and calcium chlorid may be added before developing carbon dioxide.

The temperature at the beginning of treatment is best at a body heat, gradually cooled down with each succeeding bath, the duration to increase from seven to thirty minutes. A further advantage of this form of bath is the agreeable sensation of warmth, due to the rapid and continuous dilatation of peripheral capillaries, and according to Goldscheider, to the specific effect of the acid upon the heat points of the skin. The bath-tub may be covered to prevent escaping carbon dioxide from vitiating the air. A larger volume of urine is voided after each bath, warm or cold, a symptom of the reestablishment of compensation and an improved circulation.

All diseases of the heart and circulation may be advantageously treated with these methods, except when complicated with nephritis in the advanced state and sclerosis of the coronary arteries, in old patients with advanced degeneration of heart muscle. Steam baths should only be used when the respiratory apparatus is intact. Liquids ought not to be reduced when the urine contains a large quantity of urates and uric acid, unless a larger quantity is voided after such a reduction. Fatigue must always be avoided. We want to strengthen and make muscle, not to overtax what is left. Prolonger and absolute rest is injurious in all cases, even in advanced atheroma and sclerosis of the arteries, aneurism of the aorta, and advanced Bright's disease. Under this treatment there will be slow progress; frequent examinations are necessary in all cases."

To the labors of Oertel, the originator of the mechanical dietetic treatment; of Winternitz, the father of hydro-therapy, and of the Schott brothers, who have made the treatment of cardiac diseases with the carbon dioxide bath popular, I am largely indebted for the facts presented in this paper."

STATIC ELECTRICITY.

EDITED BY J. H. BURCH, M. D.

Physical Therapeutics in the Treatment of Sciatica. N. Y. Med. Journal.

Dr. M. L. Barshinger presented a valuable paper before the York County (Pa.) Medical Society, March 5, 1908, in which he reviews the etiology, pathology, and treatment of sciatica.

In regard to the essential nature of sciatica, Dr. Barshinger differs somewhat with the generally accepted idea of its being a simple neuritis of either the nerve itself, or its cords of origin. He regards at least ninety per cent. of the cases of sciatica as forms of secondary neuritis dependent upon pressure. This pressure Dr. Barshinger considers to be in the greater number of cases due to spasmodic contraction of the pyriformis muscle.

Dr. Barshinger refers to the anatomical relationship of the sciatic nerve as it leaves the pelvis and enters the thigh. In its passage through the sacro-sciatic notch with its accompanying vessels, he calls attention to the fact that anteriorly it lies close upon the bones of the pelvis. Posteriorly, the pyriformis muscle lies immediately over the nerve and rests closely upon it.

Dr. Barshinger affirms that, as a result of gout, rheumatism, or exposure after excessive muscular exertion, the muscular structure becomes the seat of local irritation rather than the nerve itself. The pyriformis muscle becomes irritated and, as a result, contraction takes place that necessarily impinges upon the nerve structure. By means of this pressure the nerve itself becomes the seat of secondary irritation.

In regard to the treatment of sciatica, Dr. Barshinger obtains his best results by a combination of physical methods. Mechanical vibration, he affirms, is especially valuable. To be of benefit, however, Dr. Barshinger advises that thorough vibration must be resorted to. The resisting pyriformis must be felt to relax, after which, vibratory stimulation should be applied to the spine from below upward as far as tender points reveal themselves. This treatment is advised by Dr. Barshinger in the early stages of the disease. In the more advanced cases the method must be used with great caution, especially over the region of the sacro-sciatic notch.

Dr. Barshinger also directs attention to the value of the high-power incandescent lamp in the relief of this painful condition.

Static electricity is especially recommended by Dr. Barshinger in the treatment of sciatica. He affirms that the wave

current relieves the stasis of the engorged and irritated pyramidal muscle by means of its powerful mechanical effect upon tissue brought into immediate contact with it. Dr. Barshinger describes the wave current as a rhythmical mechanical movement of great penetrating power. Applied over the region of the pyramidal muscle a process of expression is set at work toward expelling and emptying the muscle of its foreign contents of infiltration fluids together with the products of inflammation. Dr. Barshinger recommends that the wave current should be followed up with powerful static sparks, or sparks derived from a high-frequency apparatus.

The constant current and the x-ray are also recommended by Dr. Barshinger in the treatment of some cases.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

The Treatment of Nevus Flammeus. From the American Journal of Dermatology.

Any method which will remove those unsightly blemishes known as port-wine marks, will be received with gratitude by the medical attendant as well as the patient. The old methods of removal by excision, curettement, as well as the barbarous use of the cautery, have become obsolete. Until the discovery of the x-ray the electrolytic needle was the only feasible means available, and as a cosmetic the results of that treatment were not brilliant. In regard to the use of the x-ray, the author claims a serious disadvantage as the method cannot always be depended upon, and as a result, marked x-ray burns are also apt to ensue, "making the cure a worse deformity than the one it was intended to cure."

The author claims radium to be the remedy *par excellence* in the treatment of port-wine marks. He goes on to say: "Recently they have been submitted to the action of radium and the results are stated to be of the best. The macules that are not elevated, as well as those above the surface of the skin and the deep variety, disappear after the application of apparatus covered with a special varnish with which a salt of radium has been incorporated. The dosage is so fixed that a certain determined action may be obtained according to the number of applications made and the length of time consumed in each one. Contrary to the condition of flat macules and such as are but slightly elevated, whose disappearance is accomplished by applications of long duration, the results are obtained by weak doses which are frequently repeated. This is the method which is employed in the cases of angiomatous tumors whose

regression is desired. These latter, even when of considerable size, undergo a progressive diminution in size, which goes on to a complete disappearance, under the influence of the radium rays. These applications are painless, a fact which permits of the treatment of large lesions and of children that are very young without disagreeable accompaniments of other methods. All these are certainly advantages of the highest order.

'There is but one disadvantage, which is a capital one—it is comprised in the high price of the radium and the great difficulty of obtaining even the infinitesimal quantity.'

"*The Removal of Moles which Occur on the Face* should not only be done but should be urged by the physician, as they are liable to become epitheliomata when the patient grows older. They should be destroyed by means of the electrolytic needle, care being taken not to produce a scar.

"Warts are of so many varieties that a volume could be devoted to their consideration. *Neurotic warts* are easily caused to disappear by the use of a descending labile galvanic current, and the results appear truly magical. The current should not be stronger than eight milliamperes."

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

(Continued from page 390.)

CHAPTER V.

RADIANT ENERGY IN THE TREATMENT OF SIMPLE INFLAMMATION.

With simple inflammation in contradistinction to infection, the curative effects of radiant energy will depend upon the extent and site of the lesion, as well as upon its chronicity. Injuries arising from superficial trauma, as wounds or sprains, of small joints, when treated early, may be largely relieved by the energetic application of radiant light and heat; whereas, in the treatment under similar conditions of large joints or deep-seated injuries, it will be quite inadequate in any event; as

also in the treatment of inflammation in which stasis is fairly extensive and well established. It is absolutely useless to expect to relieve established stasis by treatment with this form of energy. For the relief of regions of local stasis, those who are familiar with their action and use turn naturally to the static currents, which by throwing the involved tissues into activity by the induction in them of rapid contraction and vibration, alternating with intervals of rest, which force out the infiltration, induce active metabolism and restore the lymphatic and blood circulation by pressing open the venous and lymphatic channels.

Pain is relieved by the application of radiant light and heat energy in regions of local inflammation on account of the induced relaxation of the tissues, the increased elasticity induced, relieving the pressure upon the nerve filaments, which is undoubtedly due largely to the effect of the radiant heat, as the same effects are derived to a less degree by applications of convective heat. This relief of pain should not delude any one into expecting to effect the cure of an inflammatory process in which stasis is once established for the effect is transitory, not curative. So in the treatment of sciatica, brachial neuritis, or severe sprains, excepting in the earlier stage of the affection, it is useless to expect to afford more than temporary relief from the administrations of radiant energy, whereas the employment of the static electrical currents insures prompt relief and the ultimate cure of these conditions, when accessible; i. e., when not within the chest or pelvis. Radiant light and heat, however, in connection with the static currents, are useful in the treatment of the forms of neuritis and joint inflammations, but must be employed in all cases, if at all, before the static current is applied, for the purpose of improving impaired local metabolism and nutrition in the tissues involved on account of the lowered function of the local nervous mechanism. Applied in these conditions it affords temporary relief from pain, but is not instrumental in removing the *bête noire* of simple inflammation—inflammatory stasis; its only function being to prevent inflammation at the outset; but when once established, radiant light and heat are absolutely impotent. When applied after static treatment radiant light and heat relax again the tissues rendered tonic at the site of the lesion where accumulated infiltration, which is causing pain by pressure, has been

forced out by the contraction induced in the tissues by the current.

Post-operative use of radiant light and heat employed immediately over the site of the operation is valuable from three points of view: (1) relief of pain; (2) the prevention of scar tissue in the line of sutures; and (3) the induction of active hyperemia which both promotes nutrition, and, by the added increased presence of phagocytes in the region involved, lessens the possibility of local infection.

The same principle applies to the treatment of sites of local operation as well as of recent wounds and injuries, and for the same reasons. In myalgias, muscular sprains, and local areas of pelvic tenderness and pain, the beneficial effects of light and heat radiations will depend most upon the relief of disturbances of metabolism or its effects upon the presence of local infection.

The method of treatment of simple inflammation, as well as of the infectious type of inflammation, consists in the localized application of light either from a small hand lamp of 50 to 100 candle power when the affection is slight, or the employment of a lamp of higher candle power for constitutional treatment or over large areas. In the treatment with light under these conditions, the application should be made at a distance that will give as high a temperature as the patient can withstand. The disengaged hand of the operator or the hand of the patient, when frequently passed over in contact with the surface during the administration of radiant light and heat, affords temporary relief, making it possible to keep up the treatment more energetically than otherwise. In applying radiant light and heat, the application should not be made with the lamp in a fixed position, but by constantly moving it about or swinging it to and fro over the involved area. The light should be employed in this manner for two reasons. (1) As great a degree of temperature cannot be applied persistently as interruptedly, and (2) because administered interruptedly, waves of contraction are induced in the tissues in response to the stimulating effect of the intense heat, and in the interval before the subsequent application there is a relative relaxation. The stimulation to contraction and intervening release, operating to a degree in the same manner with the alternate contraction and relaxation, occurring with the application of the static wave current, and so effecting to a less degree the relief of local inflammation and stasis by tissue drainage.

CHAPTER VI.

RADIANT ENERGY IN THE TREATMENT OF INFECTIOUS PROCESSES.

The greater field of usefulness of radiant light and heat energy is found in its remarkable potency when associated with its congeners—the x-ray, high frequency currents, and convective heat in the treatment of infectious inflammation.

The attention being paid at this time to the subject of hyperemia, as influencing inflammatory conditions, has until recently ignored the important fact that local phagocytosis is the important effect, to which the writer called attention editorially in *THE JOURNAL OF ADVANCED THERAPEUTICS* for March, 1907, and in a paper published in the same journal in January, 1908.

Probably no investigation of recent days has been so full of significance and so fruitful of a revolutionary procedure as the treatment of local and general infections. The work of Wright in the discussion of opsonic indices of resistance, has opened up a new point of view in connection with the all but established theories of Metchnikoff of phagocytosis.

The fact that a region is rendered intensely hyperemic by the application of an agency which brings into the field of infection an increased influx of fresh arterial blood, rich in phagocytes, favoring a positive chemiotaxis, as previously suggested by the writer, establishes rationally the indication of such measures as accomplish that effect for the treatment of all types of local infection. If an increased influx of blood were associated with a coincident relief of the induration which walled in an advanced infection, the employment of measures which induce local hyperemia would be involved in an element of danger, lest the infection might thereby be disseminated. In the relaxation of tissue which does occur, however, there is sufficient influx of fresh blood to the seat of the infection, carrying with it fresh phagocytes, to unfavorably affect the existence of the germs in an infectious process without danger.

The means at present in vogue by the votaries of the methods of Bier, are fraught with elements of defect not found in the relief of local infection by the x-ray, light and the high

frequency currents. Their errors reside in the facts, that (1) powerful suction produces a degree of mechanical injury to the local area, and (2) because the method by bandaging, cutting off the return venous circulation and preventing a normal influx of arterial blood, creates a deficiency of oxygen in the tissues does not favor positive chemiotaxis; because of the venous stasis induced. Whereas in the employment of radiant light and heat, two effects are produced unfavorable to the germs in the localized area, the tendency to which is opsonic: (1) the actinic action of light is adverse to the activity and energies of many types of bacteria, and (2) that all germs which exist upon the human body develop most favorably at the body temperature of 98.4 but are inhibited by the energetic application of radiant light and heat, while the blood stream, which is passing in and out of the area, is cooled at the periphery, returning constantly in a fresh stream to the site of involvement, thereby giving advantage to the phagocytes with adverse conditions exerted upon the elements of infection—in effect opsonic. It is furthermore probable that under the applications of radiant light and heat the phagocytes are more active in their war upon the bacteria.

It is already a well-demonstrated fact that whether these theories as to the action of radiant light and heat upon the germs and phagocytes are correct; or that if not for these reasons, given, they are for some other reasons; for clinically the effect upon local infection of these applications is that such processes do yield to the combined application of radiant light and heat, convective heat and the high frequency currents all of which induce intense local hyperemia, and that the promptness and energy with which the effects are obtained, are accentuated by the previous applications of the Roentgen ray, which probably is due to the fact that the ray sterilizes or inhibits the activity of the germs localized in the area of infection, while the elements of the blood which are shielded, except as they pass rapidly across the field of irradiation, are not adversely affected by the Roentgen ray.

It is the writer's practice in the treatment of infectious conditions, to make a prolonged—twenty to thirty minute—exposure to the Roentgen ray, making use of the energy usually employed in the treatment of skin diseases for the purpose of inhibiting the activity of the germs and then permitting an in-

terval of twelve to eighteen hours before the administration of the radiant light and heat, or high frequency current or both. The germs thus brought into a state of complete inhibition, increased by the delay, are in a condition for the phagocytes brought fresh into the area, and in larger numbers, with the hyperemia induced by the radiant energy, to devour them with a greater energy. By this method it is possible to abort any accessible pus process prior to fluctuation.

In cystitis, and the deeper-seated pus processes, the employment of the x-ray should be persisted in with shorter exposures on alternate days until the pus has entirely disappeared from the urine. These observations are based upon a series of clinical results obtained by the writer in the treatment of carbuncles, furuncles, cystitis, and other septic infections, without an unsatisfactory result during a period of five years.

It can be truly said that in the applications of radiant light and heat, the x-ray, and high frequency currents we possess the greatest means for coping with a large class of infectious conditions, particularly the streptococcic and staphylococcic infections. We have reason to believe that the same rule applies equally to tuberculosis and gonorrhea, and to a greater or less degree in all other types of inflammation arising from infectious causes. It is a subject fraught with the greatest possibilities and deserving immediate serious investigation, and general adoption.

SOCIETY MEETINGS.

MEETING OF THE COMMITTEE OF CHAIRMEN OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

At the Engineers' Societies Building, June 13, 1908. President, Dr. Herbert F. Pitcher in the chair. Dr. Albert C. Geyser, Secretary of the Association, acting as Secretary of the Committees. The President called upon the Chairmen of Committees for their respective reports.

The Committee on Static Currents.—Dr. Snow, Chairman, presented the following report which was received and placed on file.

Mr. President and fellow members of the Committee of Chairmen: In accordance with the resolution passed at the late meeting of the American Electro-Therapeutic Association,

I have prepared the following report as Chairman of the Committee on Static Electricity.

Looking to the subject from the point of view of *physiological effects* and *therapeutic indications*, the following broad conception of the subject will be taken.

1. *Static electricity*, according to the method of administration or modality employed, is characterized by three distinct qualities of action: (1) the mechanical, (2) the actinic from effleuve and vacuum tube administrations, and (3) polarization, electrolysis being insignificant. From the respective effects the following laws may be evolved:

(1) The modalities of the static current produce to a greater extent than any other diffuse, penetrating tissue and protoplasmic contraction with a minimum of irritation, when the wave current, static induced current, the vacuum tube current administered directly from the static machine or the static spark are properly administered. They are therefore the measures *par excellence* in therapeutics for the dispersion of *pathological stasis*.

(2) For the same reason as stated in the preceding observation, the same static modalities which mechanically induce tissue contraction, excite vibratory activities in torpid areas, stimulating to a great degree local metabolism, with re-establishment of circulation and tissue repair where stasis and impaired or obstructed elimination are present.

(3) Another mechanical effect associated with the administration of the static modalities, administered with the patient insulated, is occasioned by the surging of the current from the point or surface of application or discharge. The effect of the passage of the substantial electrons is to induce degrees of general metabolism which is evidenced by the marked increase of secretion and general awakening of functional activities.

(4) Polarization associated with the passage to and fro through the patient of one polarity with a unidirectional current, induces effects in the tissues which coincidentally awaken in another way activity.

(5) *The actinic effects*, in common with the high potential coil and static modalities associated with the radiations evolved within the vacuum tubes and the convective discharges (the effleuve, the brush discharge, and spray), are capable in varying degrees, according to the volume of current evolved, of destroying germ life superficially located, and in some instances to considerable depth within the tissues.

(6) *The phoretic action* of the current administered with the vacuum tube is capable of forcing into the tissues minute particles of nitrous acid evolved by the discharges and other medicinal substances, rendering them valuable in the treatment of superficial infected conditions.

(7) *Muscular spasms* of peripheral origin are locally re-

lieved by the static modalities, either by the removal of sources of irritation or direct action upon the neuro-muscular mechanism.

Such broad conception of the indications for the employment of the static modalities would indicate their use in all non-infected, inflammatory conditions, internal and external, and for the energetic re-establishment of local and general metabolism. The following special indications are conserved by them:

(8) The static spark and static wave current, and to a less degree the brush discharge and the direct vacuum tube current, are the means *par excellence* for the treatment of all *non-infectious joint inflammations*.

(9) In the treatment of uncomplicated *neuritis* in regions accessible (the only exceptions being within the pelvis, chest wall, and bones of the skull) the static wave current, static spark, brush discharge, and direct vacuum tube current, alone or in combination, are uniformly effective in skilled hands and the choice of methods in those cases.

(10) In the treatment of *spinal cord affections* of a non-infectious inflammatory character including *tubes*, *anterior poliomyelitis*, *myelitis*, *syringo-myelia*, and the *dystrophies*, the static wave current to the spine and sparks to the periphery, in adults meet the conditions present, to effect which they must be applied with great energy over the site of the lesion of the cord.

(11) In the treatment of *pelvic* and *genital* conditions non-septic in character, the static wave current, and direct vacuum tube current, are effective in the following conditions: *uterine congestions* and *dysmenorrhea*, *subinvolution*, *cervical ulceration*, *salpingitis*, *ovaritis* (usually secondary), *urethral caruncles*, *vaginismus*, *hemorrhoids* (not indurated), *fissure in ano*, *rectal ulcers*, *prostatitis* (not removing hyperplasia), *vesiculitis* (specific and non-specific), *congestions in the spermatic cord and canal between the internal and external rings*, *epididymitis*, *orchitis*, *chronic gleet*, and *impotency* in many cases. In all of these cases named those modalities are most effective, safe, and cordially to be recommended.

(12) In the following *glandular congestions* either the wave current or direct vacuum tube current are the choice of modalities. In enlarged and congested liver, spleen, simple adenitis, in simple mastitis, and tonsilitis before the suppuration has advanced, over the pancreas in diabetes, the kidneys in Bright's disease, the adrenals in Addison's, and the thyroids early in simple goitre and Graves' disease; over the stomach, duodenum and ileum when secretions are abnormal or deficient; over a dilated stomach and constipated bowels. In the above conditions the static modalities are very effective, more so than other agents in most cases, because by inducing active energetic in-

trinsic contraction they remove congestion and infiltration and restore tone and metabolism.

(13) Conditions of *spasm* or *muscular contraction* are relieved by the static modalities, particularly by the sparks and wave current. Either through the secondary effect of relieving congestion, as when associated with joint diseases, in dysmenorrhea or vaginismus or by the direct antispasmodic influence in other conditions, as in high arterial tension and acute spasm, as in muscular cramp.

(14) On *general* and *local metabolism*, when not complicated by organic disease, the static modalities, particularly the wave current, are remarkably efficacious and indicated as part of the régime in all cases; because all of the functions are demonstrated to be quickened; weight increased, hemoglobin percentage is increased, an approach to normal in the blood count induced; all due, undoubtedly, to a quickening of cell activity throughout the economy, owing to the stimulating influence of the passage everywhere of the rapidly moving electrons.

Committee on Cataphoresis: Dr. Chas. R. Dickson, Chairman: Dr. Marcus F. Wheatland reports that he knows of nothing especially new along the lines of phoresis, but thinks that it might be well to call attention to the advantage of the use of a twenty per cent. solution of Churchill's tincture of iodine at the negative pole, instead of the ordinary use of plain water or bicarbonate of soda in moistening the cotton-covered electrode which is generally used in the absorption of pelvic exudates. The negative pole applied against the diseased area attracts thereto the alkalies with their softening and disintegrating effects. The iodine being electro-negative is simultaneously driven off from the negative pole, enters the tissues, and combines at the end of treatment with the alkalies, thereby increasing their absorbent effects, producing more rapid absorption of the exudates than otherwise. He has likewise found the use of Churchill's tincture of iodine, full strength, very beneficial in simple endometritis (uncomplicated by pus tubes) used upon an electrode * such as he described some years ago. It is absolutely safe. Many seem to be afraid of it on account of the dread of forcing fluid into the fallopian tubes, which is absolutely impossible, for when the fluid is forced out of the syringe it readily finds its way into the vagina by capillary attraction along the fibers of cotton.

He has noted the reports of the work done by Le Duc in absorbing the thickenings of anchylosed joints, and of Lewis Jones in the use of twenty per cent. solution of magnesium sulphate at the anode for warts, but has had no personal experience with either method.

* A cut, which will be appended to formal report, accompanies letter.

The other members of my committee have not replied to my letters.

Dr. George Balmer, one of my assistants in the Department of Electricity at Toronto General Hospital, is carrying on some experiments in phoresis at the Hospital, with promising results which will be reported later. On a case of tic, cataphoresis with solution of sodium salicylate has proved beneficial, and on a tuberculous stump of thigh, which had not been benefited by x-raying, or cataphoresis of iodoform, anaphoresis with thymol and creosote is giving encouraging results. I trust that Dr. Balmer may be enabled to carry out a number of other phoretic procedures.

Personally, I have nothing new to offer in this interesting field.

Committee on Phototherapy.—Dr. Titus: My report is not a written one and therefore not very full. I have not heard from Dr. Barrett of Westbrook, Me. Dr. Crothers promises a paper at the Annual Meeting. Dr. Finkelpearl likewise promises a paper at the Annual Meeting. The Chairman of the Committee has this to say.

Recent observations by advanced physicists have called attention to the acceptance of the electron-theory of light, and the importance of considering the element of pressure in the physics of light therapy, to account for the constant and uniform effect of this complex form of energy. When we consider, as has been shown, that the estimated pressure of light exerted on the earth's surface is 75,000 tons, some idea may be had of its influence on both health and disease

Committee on Radiography Dr. Kassabian.—Mr. President and members of the committee. I did not prepare anything to read before the committee but I will prepare a report as soon as possible for the next Annual Meeting.

Committee on High Frequency. Dr. de Kraft: I have written to the different members of the committee but have received no work from anyone. Dr. Strong's letter came back from the deadletter office unclaimed. The rest of the committee have simply done nothing. I don't think it would be right to take my report as the expression of the committee. I did not think that this was meant for a meeting for the purpose of bringing in a definite report. I have some, but only my own. I cannot say that it is the report of the committee.

Preliminary Report on High Frequency, High Potential Currents: Either a coil with mechanical break or a static machine of 16 to 20 revolving plates, run at a fairly high rate of speed may be used as a source of current for actuating the Leyden jars or condensers of a resonator.

In speaking of the employment of high-frequency currents, the source whether coil or static machine, and the method of employment, should always be given, in order that we may form an idea of the value of a reported result.

The short, hot spark from a resonator actuated by a coil is of great value in destroying warts, skin cancers, exuberant granulations, cancer, etc., and according to the method of Hart (electric fulguration) can be of service in destroying large cancers.

The short, hot spark from the D'Arsonval or Tesla solenoid, actuated by a large static machine possesses sufficient amperage when used by the bi-polar method (a metal plate opposite the point to be sparked, and a small ball electrode to the point to which the spark is to be applied) to produce cauterization and tissue destruction in the same class of cases.

The resonator spark (whether from coil or static machine) is very rich in actinic rays, and when used in its longer form, with less amperage, is of use wherever a stimulating non-cauterant action is desirable, as for sparking nerve trunks in neuritis, and neuralgia or rheumatic joints. The effluve or spray seems particularly effective wherever we wish to produce rubefacient action, and is helpful in such conditions as sciatica, brachial neuritis and neuralgia, etc. The effluve to the chest in tuberculosis is particularly helpful.

Vacuum tubes applied to a part by the bi-polar method, when connected to a D'Arsonval or Tesla solenoid, are very efficient whenever we wish to produce a decided superficial as well as deep hyperemia, and elevation of local temperature, and germicidal action.

Auto-condensation by means of the D'Arsonval current (from coil or static) is successful in the lowering of arterial tension.

A peculiar effect has been observed by the writer so often when employing this method in cases of gleet, gonorrheal rheumatism, one case of Bright's disease, tuberculosis and chorea. There seems to be a reaction perhaps due to some influence of the current on the toxins, which occurs after a variable number of daily applications. It is characterized by a chill, fever, and sweat, the condition lasting from a few hours to several days. If treatment is stopped for a few days when this occurs, and then continued, using currents of lower amperage—250 to 300—improvement of the patient's condition will be rapid.

Greater success has attended the use of currents of 150 to 450 milliamperes in arterio-sclerosis, tuberculosis, etc., than when higher amperages were used.

There is a method of applying the Oudin current (from a static machine particularly) which does not seem to be generally known, but which is very useful. It is as follows:

Seat the patient in a comfortable chair on the insulated

platform; apply a metal plate (size about 3 x 12 inches) to the patient's back, and connect this to the Oudin resonator. While thus connected, sparks can be drawn from any part of the patient's body. Glass electrodes held in the operator's hand will light up when placed against any part of the person of the patient, so that it is possible to treat joints, etc., quite satisfactorily in this way.

Again we can attach a brush or ring-shaped electrode to the Tesla, and holding the electrode three or four inches away from an arm or leg, produce muscular contraction.

Committee on Mechanical Vibration. Dr. Morse: Mr. President, I am somewhat in the position of Dr. Kassabian and Dr. de Kraft. I did not understand that we were to prepare written reports. I have, like Dr. Kassabian, been busy, and unable to prepare anything; but what I had proposed to do was not to give a paper on the principles of Dr. Snow's idea of the static, but of the conditions in which mechanical therapy can be used in treatment; and when we say vibration we do not limit ourselves to mechanical vibration by the vibrator; but to the way in which mechanical vibration may be utilized by the static, coil, and some of the wave current effects, as well as the surging effects of the sinusoidal, faradic, and galvanic currents.

I don't mean to be quite so broad as I put it, but I mean that we can get mechanical effects from different sources.

Committee on Thermotherapy.—Dr. Munroe: I have heard from Drs. Skinner and Goodell, having called upon Dr. Skinner in New Haven. I have a great many cases which I have treated and tabulated; having marked the temperature, pulse, and tension. Have had urinary and blood tests made, all of which I expected to present in my report. I did not understand that I was to bring a written report, so I will merely report progress.

Dr. Pitcher: That seems to be the idea of a great many of the Committee. They really do not know what line to work on. Whether it is to give a report of the methods, or what has been discovered, or what they have found in their own experience. As Dr. Munroe says, he has come here to talk over the subjects and find out what was to be done. The next on the list is dietetics. Dr. Cohn. Dr. Price of the Committee gave a report as follows which was received and placed on file.

Committee on Hydrotherapy: Dr. Curran Pope, Chairman.

Dr. Davis of the Committee said: "I have never made any specialty of hydrotherapy and know very little about the subject, and for that reason I have no report. I came here to-day more especially to learn what the Chairman wanted of me. I think I have the drift of this meeting now, but did not know

what the object was. It seems to me that if the report of this committee is to be valuable, it must consider the physiological actions and therapeutic uses of the different measures, and so long as I am on this committee, when I go home I shall endeavor to look into the subject. I know that we have in Boston a system of baths, along these lines and I will endeavor to investigate and make some report.

Dr. Pitcher: Dr. Davis has promised to do what I hope every member will do.

Committee on Dietetics.—Dr. S. Cohn, Chairman: In the absence of Dr. Cohn Dr. B. S. Price made the following report. Dietetics in its relation to the human organism is a matter of great moment; but it cannot be calculated upon a mathematically scientific basis, which will permit of a definite prescription of diet to all individuals of any one class—either in health or disease.

This difficulty arises from different factors: chiefly because of the individual differences in metabolisms and idiosyncrasy, which to some degree make every man a law unto himself.

Upon the whole, food meets two ultimate requirements: to supply the body with materials for growth and renewal, and with energy or the capacity for doing work. The energy, received in a latent form, stored in the various chemical combinations of foods, is liberated as kinetic or active energy; in the two chief forms of *heat* and *motion*, force is the manifestation of energy. In health, something less than one-fifth of the force developed in labor is expended in motion and the balance in heat.

In the absence of disease, great variations occur from time to time in an individual's requirements of particular foods and his ability to digest, assimilate, and eliminate the same, according to his existing state of activity,—mental condition and appetite, as well as outside conditions (temperature, climate, etc.) palatability of foods, daintiness with which they are prepared and served, etc.; while in disease, not only the same factors are at work, but also the obstacles resulting from abnormal functions. And here must be considered the extent of vicarious functioning, as well as of the increased needs.

While a reasonable selection of food materials is of great importance, there are other considerations which we cannot afford to lose sight of and which determine largely the extent of metabolism by their influence upon the physical, chemical, and physiological actions. Among these conditions, in health and in most diseases, the mental influence holds the most important position. A cheerful state of mind, and similar surroundings, instantly aids not only digestion but assimilation, and elimination as well, and when obtainable is as efficacious as majority of severe diet lists, which are so often prescribed.

Next in importance to this come the mental impressions derived from the food served. The difference is enormous between oz. 2 of clean, fresh milk served in a clean, neat vessel upon a similar waiter, to be drunk immediately, and oz. 6 in an uncouth tumbler, served by hand or placed upon a table beside a cuspidor or other nauseous articles for the invalid to help himself from at will, and vastly in favor of the former; or the semi-solid foods carelessly smeared over the edges of the container and sufficient in amount for a laborer.

The taste of the food to the individual, its odor and appearance, determine largely the extent of the salivary secretion, and, to some extent, also that of the gastro-intestinal tract. Of equal importance is the care of the invalid's person, cleanliness, oral hygiene, condition of linen, etc., in relation to his food.

With attention to these matters, more food and of a less digestible nature, may in most cases be taken and utilized with equal impunity.

There are several general principles which must guide us in the selection of foods, such as the demand for nourishment, as influenced by the nature of the morbid process, e. g.; (A) *acute local inflammations, acute infectious diseases, and chronic suppuration*. The perverted conditions associated with certain diseases render it impossible to secure the metabolism of sufficient food nourishment for the production of the heat incident to the disease, and this leads to the drawing upon the body tissues for such combustion.

(B) *Location of Disease*, or its special effect upon certain organs; e. g., in disease of the salivary glands, the question may be considered as to the extent of starchy digestion possible in the intestines without the aid of the ptyalin enzyme, or in gastric disease the lessening of proteids with substitution of carbohydrates, while in intestinal disease, the reverse obtains. Yet we must not carry this differentiation too far.

(C) *The normal requirements* of the individual and his food habits must be considered,—whether his combustion chambers are builded on the economic or wasteful plan,—and whether he is accustomed to mixed liberal diet or otherwise.

As a next step we may consider the *composition of the various foods in their relation to their particular requirement*. If animal food, select the particular form indicated. If vegetable, consider the proportion of nitrogenous elements contained. If we wish a high percentage of nitrogenous material, the legumes would be chosen and this is sometimes preferable to the animal form, or if a preponderance of carbohydrates is desired, the more starchy vegetables, as, potatoes, rice, arrow-root, and cornstarch would be used, while the green vegetables which contain little starch or nitrogen, and much woody fiber

and antiscorbutic elements, would fill another indication, and so on. Condiments—tea, coffee, cocoa, etc.—used judiciously are valuable in many cases.

In *special conditions*, as the (1) *acute infectious febrile diseases*—where there is excessive destruction of the fluids and tissues of the body, with increased excretion of urea and carbon-dioxide, and in which gastric digestion is usually most seriously involved, and the intestinal digestion less affected—the indications are for the use of less albuminous foods and more carbohydrates and fats in easily assimilable liquid form, as, whole milk diluted, junket, egg-albumen, strained gruel, barley-water, and toast. Choosing for administration of the more substantial meals the hours when the febrile processes are lowest, and adding during convalescence and in protracted fevers, gelatin, blancmange, chicken-jelly, strained cream of potatoes, peas, young asparagus, tomatoes, and celery cooked in milk.

(2) *In acute gastritis*, temporary suspension of all foods by mouth is often of prime importance. Upon returning to food, begin with small quantities frequently taken, of clam-juice, diluted milk, junket, and gradually increase to above febrile diet, scraped beef, etc.

(3) *In chronic gastritis*, buttermilk, skimmed milk, milk diluted with hot water or a cereal water, beef tea, scraped beef (carefully prepared), and often starches may be cautiously given, as cornstarch, arrowroot, baked white potatoes, cold boiled ham, whites of eggs (raw, poached, soft-boiled, etc.), dry oven-baked toast, and well-cooked rice, are among the more useful of early dieting, with moderate amounts of the less acid fruits.

(4) *In intestinal indigestion and indicanuria*: milk preparations, clear meat soups, scraped beef cakes with a moderate amount of stale, well-cooked bread, rice, egg-albumen and later, white meat of chicken, macaroni, cornstarch, and baked potatoes, drinking freely of bland fluids.

(5) *In constipation not depending upon dyspepsia*; free use of fruits, vegetables,—especially, the green as carrots, spinach, etc.,—cereals, including the bran, crisp bacon, much butter, cream, and oils, and properly prepared nut-foods with more or less exclusion of meat and liberal quantities of water, are the principal indications.

(6) *In anemia* is indicated free use of digestible albuminoids, milk-foods, scraped beef cakes, bone-marrow, whole bread sandwiches with dry crisp bacon or almost raw beef (scraped), and butter, eggs in digestible form, all in as large quantities as possible, and with digestants if necessary.

(7) *In the so-called rheumatic diseases*, which are conditions of faulty metabolism with imperfect oxidation of the nitrogenous matters and intestinal infection with fermentation, the indications for diet, are, to lessen nitrogenous animal foods

and increase the farinaceous, with moderate use of fresh green vegetables, more or less rich in proteids; milk, rice, cereals, macaroni, arrowroot, and the easily digested varieties of fish (white flesh only), are especially useful, also eggs, white meat of fowls, while cream, butter, cream-cheese, and oil should be used in small amounts. The medium acid fruits are allowable, and large quantities of water are imperative.

Dr. T. H. Cannon said: Mr. President and Gentlemen.—If you will pardon this intrusion upon your time, I would like to call your attention to the fact that none of the reports thus far read have conformed to the resolution of Dr. Snow which was passed at the last Annual Meeting of the Association at Boston, inasmuch as none of them have dwelt solely upon physiological facts. My conception of this resolution was that the various committees were to deal solely with such facts as were generally accepted and were to be formulated as "Laws." The reports thus far read fail absolutely to show any intention to formulate laws, and seem only to deal with the personal experience of the writers. This, I think is wrong, as we were appointed to investigate the various claims as to results obtained from the use of various claims as to results obtained from the use of various physical measures, and to present such reports as we have heard read would only subject us to ridicule.

While the personal results of the various writers would be very valuable and of much benefit to the Society as a whole, yet I think we should, as our bounden duty, limit ourselves first to the consideration of the "physiological laws," and then, as a supplementary report, submit our new discoveries, etc.

Committee on Therapeutic Exercise.—Dr. Frauenthal: As chairman of the Committee on Therapeutical Exercise, it is my conception of the functional committee that we report what was to be the consensus of opinion of the various members as to the generally accepted use of exercise of therapeutics, and had hoped that Dr. Savage, who is associated on that committee, and who is exclusively engaged in this work, would render me a written or verbal report. As he has failed to do so, and I have not heard from the other members of the Committee, I will not attempt to give a résumé of a year's work, but confine myself to my own opinions and experiences, extending over a term of years, after a method of my own, based on some scientific observations, which will be given later. And the report, which I will present to the Association in September, unless I hear from Dr. Savage and the other members of the Committee, will simply be my own work, based on some theories and practice of myself and others carrying on this work.

Report of Chairman of Radiotherapy Committee.—J. D. Gibson, M. D. (Report received too late for presentation): I think

that Dr. W. B. Snow has defined the therapeutic action of the x-ray in his paper "Physiological Laws Relating to the Effect of Physical Measures as Employed in Therapeutics," just a little better than I have seen it elsewhere. To cut anything out of the article would be only to disfigure it, and if I added to it, it would only be superfluous; so I am going to give you the article in its entirety as far as it deals with this particular subject. In the first place I want to disagree with Dr. Snow on one point and that is his first division, "*Stimulation.*" I think that he has cut this division entirely too short. I consider stimulation the most important part of the general effect of x-rays. I think in my tubercular work it is the chief cause of success in the treatment of tubercular conditions. We never wish to carry it to the inhibitive effect that we do in the treatment of cancer, and if we do we injure the patient instead of benefiting him. With this modification, I herewith quote from the article referred to.

The Roentgen ray induces two distinct physiological effects: *stimulation* and *inhibition*. The stimulating effects are of little or no significance in therapeutics, as other agents possess these qualities to a greater degree and induce them with greater certainty.

To the inhibitory effects of the x-ray, by which the cell is affected by the induction of degrees of inertia varying with the character or nutritional activity of the cell, the length of exposure, and the quality of the ray employed, is due its therapeutic value. To this inhibitory effect may be attributed sterilization of the life-giving function of the germinal spot, in seed or living creature, diminution of functional activity of the organic cell, and organ or part exposed to the extent of inducing inhibition, divulsant effects and resolution of adventitious and lowly vitalized tissue, and the extreme effects of tissue necrosis from extreme exposures, and paralysis of nervous structures resulting in dermatitis associated with tissue necrosis. These actions form the indication for the general therapeutic employment of the Roentgen ray.

(1) The sterilizing influence of the x-ray indicates its judicious employment in the treatment of infectious conditions, for effects on germs, having already proved efficacious in all fungoid affections of the skin as well as in the tubercular, streptococcic and staphylococcic affections, superficial and deep-seated.

(2) *In conditions of hyperactivity* of the glandular system and hypertropic processes, the x-ray is generally capable of inhibiting such activity, and under prudent administration in a large class of conditions under this classification is a valuable therapeutic measure.

(3) The x-ray resolves or destroys by inhibition the tissues

of low vitality, thereby promoting the resolution of scar or adventitious tissue in keloid and plastic adhesions, as well as destroying the low vitalized tissue of malignant processes. In many instances normal tissue replaces neoplastic tissue during irradiation; not from stimulation but because of release to a degree, from destruction of the tissue of less vitality as in epithelioma. From this resolvent action it should be accorded a recognized place in therapeutics, including exposures before and after operative procedures in the treatment of every malignant process.

(4) In the two types of lupus, vulgaris and erythematosus, the replacement of the diseased tissue by normal during the process of raying is rare, requiring subsequent employment of stimulating measures, as the static brush discharge, light, or the high frequency currents, which induce stimulating effects opposite to the inhibitory action of the Roentgen ray.

(5) *The hemostatic action of the Roentgen rays* is due to the influence of induced tissue contraction and is promptly effective, and indicated for the relief of the hemorrhage associated with uterine fibroids, meno- and metro-rhagia, and hemorrhage associated with tuberculosis and ulcer of the stomach.

(6) In *inflammatory processes* associated with conditions of pressure and pain, *due to exudations*, the x-ray is effective as an adjunct method in subacute cases and the means *par excellence* where organized exudates are causing pressure and pain, as in chronic *tic-douloureux*.

I think we should pay some attention to the Cornell tube. This tube is evidently intended to be used as a low vacuum tube and in contact with the skin, as directed. The question is: Does it give a pure x-ray, or does it give it combined with a high frequency effect? It is claimed that it does not produce an x-ray burn, or is not likely to. I would like to be informed as to what is the photographic power of this tube. I believe that the high frequency effect of the tube placed in contact with the skin counteracts the effect of the ray on the immediate superficial tissues and prevents a destructive action or burn.

I am more and more impressed every day with the importance of dosage in the use of the x-ray. I have seen a reaction in acute miliary tuberculosis from the x-ray, causing a rise of temperature from 103° F. to 105° F. just as promptly as it was ever done with tuberculin. This furnishes the key for your dosage, and by proper observation and management we can produce a homologous vaccine at will, and the effort should always be to keep it constantly in the positive opsonic stage.

The President then called for an expression of opinion of all present.

Dr. Heuel: As already stated, my idea would be, to have a general meeting of the various Committees, held before the

Annual Meeting is held, there to read the various papers presented and discuss their scientific value. I believe the Executive Council to be the proper committee to pass on that point.

Dr. Titus: It seems to me that it is sometimes a mistake to have so many committees. In all societies, scientific or literary, there is one body of censors. If the object of this body is to act as a committee of censors, I feel it is quite necessary. If the object of the meeting is for the consideration of the committee's report, then I say it is a good idea to get together and take them up. As Dr. Cannon suggested, I feel that some of the reports fail to express the content of the subject. A report of cases may be all right and do very well; but if we want to establish scientific principles, we must get together and discuss the conclusions of the committee's work and put it on the right track. Therefore, I think a meeting of this sort is very necessary, and that the reports of these committees should be specific.

Dr. Granger: I am a good deal in the position of Dr. Davis. I came more to learn than to advance any opinion of my own. It does seem to me that this Committee in the first place should get down to the adoption of laws; a special report written either by some members or some member of the Committee upon some special subject, as for example the reduction of blood pressure by the use of high frequency currents. I should think that in this way we could get a systematic report, and a paper that would be of great value to the Society.

Dr. Davis: I look at this thing a good deal as Dr. Titus has expressed himself. It seems to me that if these reports could be made in the right way they would be in a scientific form. It has seemed to me since I have been in this work that there have been a great many claims made as to what physical measures would do, and would not do, that cannot be confirmed by scientific experience. There are a good many results that I think we should not expect. That is one thing I noticed in connection with the claims of some concerning the Leucodescent lights. There are also a lot of other things. I think that a meeting of this sort is excellent.

Dr. Morse: I feel that the object of this meeting is to have the different members of the committees come here and outline either in writing or verbally tell what we expect to do, and then as is customary, have another meeting of the Executive Council before the Annual Meeting, that the papers may be read and criticised and if there is anything that is wrong, discuss and correct it. The object of this meeting is to put the members on their guard to work well for the advancement of the cause. I think what is expected is the physiological facts.

Dr. Snow: The object of the resolution, as I presented it, was to bring out something definite with reference to the reason we elect one measure for treatment of a certain condition

instead of others, and to establish what we can do in various conditions. We need, however, a committee devoting research to every sort of modality; by that I mean that there should be a committee on every one of these subjects known as physical measures, to bring out clearly definite physiological and clinical effects, developing definite laws of indication and methods of employment, not all in a lump, but each distinct, and that after final adoption of these by the Association they become recognized methods of action.

It does seem that the American Electro-Therapeutic Association, which is really in the van with all this work, should set the pace for those who are looking to us for light on these subjects. It seems to me, furthermore, that such a course is the proper one to pursue, and that after we come together and arrive at conclusions, after a discussion as to their indications, something invaluable will be the result in every instance. Arranged so that each of the methods and indications appear separately and not in a manuscript of general description, they can be classified as distinct laws for indication and treatment.

Dr. de Kraft: It seems to me that the institution of these committees is an excellent idea if the members of the various committees would only come together and report the real result of their united labors. It seems to me that the members of these various committees in the future should be appointed in such a way that as many of them as possible can be in touch with each other, and in that way stimulate one another to action.

Dr. Cannon: After hearing the remarks of the preceding gentlemen, I desire to say that my sole intention was to call attention to the fact that we had not complied with the commission with which we were intrusted by the members of the Association, and I desire to emphasize that fact now.

I do not want any of you to feel offended at anything I have said, as I am not dealing in personalities, for all of us are responsible for the actions and reports taken here to-day. The facts are these: In Baltimore, say, where I live, there are several men who are doing work along the same lines as I am, and yet none of us would agree as to the action of the various modalities. There are so many views held, and so many kinds of apparatus used to obtain results, that some laws acceptable to all should be formulated. While all of us are more or less familiar with the action of the various physical measures, there are many, just beginning this work, who are totally at sea, owing to the fact that they have no reliable data on which to place their reliance.

Dr. Price: Inasmuch as the chief object of this Association is *progression* along strictly scientific lines, it is not sufficient that we prepare papers merely on the old and generally accepted established laws.

Surely our object is to formulate newer basic principles,—representing a consensus of the best conclusions as a working code, for modern technic. And in order to progress, I think if we can get the opinion and report of each man, these reports representing the sum total of what all have actually observed, in the different methods of treatment, and then for the committee on each subject to consider these and abstract the whole. This would seem to be the object of the meeting.

In this way, it would require the effort of a number of committees to condense and prepare such material,—representing new but tested matter to be used as laws,—for the annual meeting.

Such a paper as my own, for instance (being old material), is of no special use, and any other such paper, along any other line, would amount to the same thing.

We must work out something from different points of view by careful, honest observers, which will prove of benefit.

Dr. Kassabian: The purpose of this meeting is excellent, but the accomplishment is not so very good on account of its being the first one. I am sorry to state that we are not making the scientific research that we ought to make, and report on our own investigations. I am of the opinion that the Chairman of the Committee should select the members of his committee from those who are near to him and willing to coöperate with him.

I would like to get more information in regard to presenting the annual report on Radiography.

Dr. Geyser: It seems to me that this whole committee business has been something of an error. Dr. Snow meant all right, but I don't think his plan has been fully understood. However, there are always certain principles and those principles are the ones that we should get at; and with that view I should suggest that, as the committees stand now, there is an aptitude not to come together; in fact, it is certain that they never do come together. When a man pledges himself, he owes it to the Association to come in touch with his collaborators. That is the only way that they will bring something of united effort before the Association, and not otherwise.

Dr. Frauenthal: I just want to indorse what Dr. Geyser said. It is a very good thing to have men come together and be able to observe the individual who wrote a paper, and see, and size him up.

Dr. Pitcher: I think that the President of an Association like this should be thoroughly familiar with the members of the Association and their work. If I were to appoint another set of Committees I would appoint the Chairmen, and have each Chairman appoint his own committee. But as it has been done, they have been chosen at random with a view to their interest and previous work in the particular subjects in which

they seemed most proficient. I am thankful to see that those who have been chosen have shown any interest in the committee meeting at all. You have all listened to each other's remarks and if there is anything further to add, I would like to hear it.

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The Journal of Advanced Therapeutics

VOL. XXVI.

SEPTEMBER, 1908.

No. 9.

INDICATION FOR THE USE OF THE SPHYGMO-MANOMETER.

BY F. HOWARD HUMPHRIS, M.D., HONOLULU.

"A man is as old as his arteries," and if it were only that an alteration in *blood pressure* gave a warning of advancing years, that fact alone would justify more attention to the subject-matter of this paper. There are, however, many other conditions resulting from or concurrent with, an alteration in arterial tension, that make the subject interesting as well as vital.

Increased arterial tension is, in all probability, responsible for the degeneration of the muscular walls of the arteries; in fact, nothing else can be conceived if granted the pathologically increased tension on the persistently contracted arterioles than that metabolism and nutrition of the muscular structure of the arteries should suffer. Muscles in any part of the body degenerate under constant tension or contraction.

The importance of early recognition of the altered blood pressure is therefore obvious; if we can recognize the pressure before it has had time to cause the degeneration, then we can by the different therapeutic measures diminish that pressure and thus avoid the otherwise resultant degeneration.

In cases where the blood pressure is giving rise to nervous trouble we can, I believe, by regulating the blood pressure to the normal, prevent those troubles from ending in permanent disease and from crossing that border line between nervous disease and mental derangement to which they are slowly but surely progressing.

An alteration in arterial tension is probably caused by unusual stimulation of the vaso-motor system. This may be due either to the circulation of irritants such as alcohol and toxins in the blood stream, or to some central nervous stimulation of the vaso-motor centers due to trouble in the brain or spinal cord.

Normal blood pressure depends upon four factors: (1) The

heart's energy; (2) the peripheral resistance; (3) the elasticity of the vessel walls; (4) the volume of the circulating blood.

High tension means a powerful ventricular contraction with contracted arterioles, just as low tension means a weak cardiac action with dilated arterioles. And here I will submit a list, modified from Leftwich, of some of the conditions under which we may expect to find altered blood pressure:

<i>High Tension</i>	<i>Low Tension</i>
Arterio-sclerosis.	Anemia.
Angina pectoris.	Asthma.
Chronic bronchitis.	Chlorosis cachexias and wasting diseases.
Cirrhosis of kidney.	Dilatation of heart.
Cerebral tumor (1st stage).	Diabetes.
Cerebral hemorrhage.	Diarrhea.
Cheyne Stokes breathing (which with H. T. is ominous).	Exhaustion.
Dilatation of aorta.	Fatty degeneration of heart.
Emphysema.	Febrile conditions, especially typhoid.
Glycosuria.	Profuse hemorrhage (except cerebral).
Gout.	Jaundice.
Hemicrania.	Obesity.
Hypertrophy of heart.	Pleurisy (2d stage).
Hysterical seizure.	Pulmonary tuberculosis, especially in late stage.
Lead poisoning and other chronic toxemias.	Pyrexia.
Malaria (cold stage).	Shock and collapse.
Migraine.	Also by hot drinks, hot air, and by the action of certain drugs, such as amyl nitrite, chloral, cannabis indica, nitro-glycerine, ether, erythol, tetra nitrate and sodium nitrite. Also by radiant lights and by the use of certain high frequency currents.
Neuralgias and other conditions of bodily and mental suffering.	Insanity with mania.
Pregnancy.	
Pleurisy, acute (1st stage).	
Uremia.	
All kidney affections except amyloid, suppurative and tubercular, except in terminal stages when cardiac weakness causes a fall.	

A too nitrogenous or too liquid diet.

Insanity with depression, including G. P. I.

Also found in healthy, active, excitable individuals as compared with healthy but apathetic individuals.

And with many of these diseases, their course, favorable or unfavorable, varies with the blood pressure, and thus the advantage of being able accurately to note the effect of treatment upon the blood pressure, is in line with such other scientific observations as we may be making. If it be of an advantage to note the pressure when feeling a pulse in the course of a disease from day to day, how much more is it of an advantage to be able to make an accurate estimation and to record the result in millimeters. "Science is measurement." A description of the instrument with which this may be done (the sphygmomanometer), may be of interest. Take for instance the Riva Rocci instrument as modified by Dr. Cook of the Johns Hopkins Hospital. It is, I believe, the only one made in this country for the estimation of blood pressure, and is probably the most accurate that has yet been brought before the profession. A closed system of air connects a rubber bulb held by the operator, with a column of mercury and a rubber band placed around the arm of the patient. By the law of gases equal pressure is transmitted to every point throughout a given air system.

When the pressure is raised by the operator to such a point that the pulse of the patient distal to the constricting band is obliterated, the height of the mercury column in the manometer is equivalent to the maximum arterial tension.

The maximum arterial tension averages about as follows:

Children 1 to 3 years	.	.	.	85 to 95 mm.
Children over 3 years	.	.	.	95 to 110 mm.
Adult females	.	.	.	100 to 125 mm.
Adult males	.	.	.	115 to 135 mm.

The mean arterial tension may be estimated as about three-quarters of the maximum arterial tension.

Posture makes some difference; between the upright and the supine position it is about 10 mm.; if it be greater than this a suspicion may be entertained that compensation for the influence of gravity is insufficient.

The accuracy of this style of instrument has been repeatedly proved. One experiment may be quoted. The armlet was strapped around the neck of a dog (excluding the trachea). A canula was inserted in the femoral artery and connected with a mercurial manometer. Simultaneous readings were taken of the pressure in the femoral artery, as indicated by the manometer, and the pressure in the carotid artery, as indicated by the sphygmomanometer. The readings in the two instruments exactly corresponded. It is an established fact that the pressures in the carotid and femoral arteries in a dog lying down are identical (Hill and Barnard).

In several diseases the knowledge of the state of arterial tension is of the greatest importance in diagnosis and prognosis. In chronic pulmonary phthisis, when the blood pressure is normal or above normal, we may look for a favorable termination, whereas, a lowering of the pressure is in most cases an unfavorable sign. In the differentiation between paralysis caused by cerebral hemorrhage and that caused by syphilis the sphygmomanometer will give a definite diagnosis even though no history is obtainable. In eclampsia even though there be an improvement in the subjective symptoms and an increase in the quantity of the urine, if the blood pressure remain high the prognosis is grave.

There are many other diseases upon which the condition of the arterial tension has an important bearing, but I will only touch upon the relation between it and insanity.

Altered blood pressure may cause mental disorder. While it is true that many persons who have an abnormally low or abnormally high tension do not become insane, so also is it true that while many people drink, comparatively few develop insanity as a result, yet it can not be denied that drink may be a cause, direct or contributory, of insanity. It is well known that insanity coexists with altered blood pressure. In insanity with excitement a low blood pressure is the rule, while in a patient who suffers from depression the contrary condition obtains.

The argument for saying that altered blood pressure may

cause mental disturbance may be advanced thus. It is a matter of common knowledge that there are cases of mental disorder in which a patient passes rapidly from marked insanity to a state of apparent health, and it is difficult to explain this except from the standpoint that the insanity depends upon some very mobile mechanism; now the vascular system is such a mechanism, and though this does not prove anything it may be taken as a working hypothesis. It has been shown by Dr. Leonard Hill that the arterioles in the splanchnic area regulate the *blood pressure* in the brain. Everyone, probably, knows the depression accompanying a loaded bowel and the mental relief experienced when the constipation is overcome, and that constipation is a prevailing symptom in the insane and in many cases of mental depression.

Another argument in favor of altered blood pressure being a cause of mental disorder is the effect of various therapeutic measures, which while they improve the patient's condition, *pari passu*, approximate more nearly to the normal, the blood pressure of the patient. And in other cases, where it has been noticed that the therapeutic measure adopted fails to improve the patient, so did it also fail to bring the blood pressure nearer to the normal. One example from the *Lancet* by Dr. Maurice Craig will make this clearer. He quotes three cases of excited or incoherent patients treated with the prolonged bath. In the first case, before commencing the bath, the patient was very excited and the blood pressure 105 mm. After the bath the blood pressure was 120 to 130 mm., and she was quiet and reasonable. After having had the bath regularly for nine days she began to keep well between the baths, and they were consequently stopped. She continued to make progress and her tension remained 130 mm. In the second case, the patient before the bath each morning used to be very excited, and the blood pressure was 100 mm. Upon being taken out of the bath the blood pressure was 120 mm., and the patient was quiet.

In the third case the blood pressure before the bath was 100 mm., and the bath was only able to raise it to 105 mm.; in this case little good was done and the excitement did not abate much.

Dr. Craig also found that melancholics did not do well with the prolonged bath, which is exactly what would be expected,

for in these cases the high blood pressure is rendered still higher.

Another argument may be drawn from the action of drugs, such as nitro-glycerine, which oftentimes will relieve the head symptoms of the insane patient even as it reduces his arterial tension.

Again it has been observed that blood pressure falls physiologically during the day. If then insanity depends upon the blood pressure, we should expect insanity with depression to improve and insanity with excitement to get worse as the day goes on. . . . And this is exactly what does happen. . . . Depression is always worse in the morning, and towards evening the misery has lessened and the patient gives little or no trouble as his blood pressure falls. Different is it, however, with the maniac. His morning time is his best, and it is towards evening that he gives trouble, i.e., as his low blood pressure becomes lower.

I have now led up to the conclusion that altered blood pressure may assist, if not be a cause, in certain individuals in producing mental disorder. Having recognized the altered blood pressure, what can be done to assist in restoring it to the normal, and what are some of the definite objects aimed at in so doing?

Frequent readings of the sphygmomanometer yield information which will enable us to follow the course of the disease and so order appropriate treatment. It is known that persistent high tension will cause the heart to become hypertrophied. This can be prevented by early recognition and treatment. It is known that high tension will cause arteriosclerosis with all its consequences. This can also be prevented. Wherever high tension exists we know that organic disease is present or that its advent is sure, unless the high tension is relieved.

I have already indicated most of the measures for the lowering of abnormally high tension. Constant purgation with salines, especially sulphate of magnesia, blood letting, hot air and radiant light baths, drugs such as nitro-glycerine, erythol tetra nitrate, and sodium nitrite, the adjustment of the dose and the interval to be regulated by the sphygmomanometer; in fact, any attempt to regulate the arterial tension without that accurate observation which is alone possible with such

instruments, is only working in an unscientific manner. Tension can also be lowered by the use of high frequency currents, notably the d'Arsonval. Sensational articles have appeared in the lay press to the effect that d'Arsonval has discovered the secret of perpetual youth by the use of this current, the papers going on to explain that, since a man is as old as his arteries, which by means of this current can be kept in a state of perpetual youth, we need never die until we wish so to do. But to return seriously to treatment, I will take a typical case of a man who has lived well and is beginning to get old. How should he be treated? We find a high tension pulse, perhaps 150 mm., and possibly some renal insufficiency. Firstly, we should treat the cause and put him on a lacto-vegetarian diet and possibly limit his intake of chlorides, because the intoxication from which he suffers is primarily of alimentary origin. Then to eliminate the toxins, frequent light baths. Light baths act not only by eliminating the toxins which are stimulating the vasomotor centers, but probably by acting on the centers themselves, for it would seem hardly possible that the elimination of the toxin alone would account for the rapidity with which such a sense of despondency will be replaced by a feeling of mental relief and buoyancy of mind which are as familiar to those who have had experience with the light bath. Lastly, in the treatment something should be done to reduce the high tension directly either with drugs or with high frequency currents.

In conclusion I would say that if we can by its use prevent the heart from becoming hypertrophied, anticipate and prevent arterio-sclerosis, lessen the probability of apoplexy, retard the advance of old age, cure some cases of insanity, relieve others and perhaps best of all prevent some cases from becoming insane, then the indication for the frequent use of the sphygmomanometer is established.



CANCER AND ITS TREATMENT BY CATAPHORIC STERILIZATION.

BY G. BETTON MASSEY, M. D.,

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(Continued from page 364.)

OPERATIVE TECHNIC OF MAJOR BIPOLAR OPERATION.

The term "bipolar operation" is employed to designate a major application in which the negative pole is applied on the center of the growth, while the active, positive electrodes are inserted either just beyond the periphery of the growth or as close to it as possible. This expedient, while inferior to the



Fig. 18.—Diagram of cataphoric and anaphoric zones in bipolar operation.

monopolar application in the production of the zone of reaction, permits the employment of much stronger currents in the necrosis of large growths of the head, neck, and left breast. Since weaker lines of current-flow curve backward from the active electrodes in wide curves, as shown in Fig. 18, in addition to the stronger and direct lines between the electrodes, a

slight zone of reaction may be secured on the distal sides of the active electrodes.

As it is often wise to end a bipolar operation with a weaker monopolar current to increase the extent of the zone of reaction, the patient is placed on the pad as described above, but the wire leading from the pad is not connected at first with the negative binding post. Instead, a bipolar negative elec-

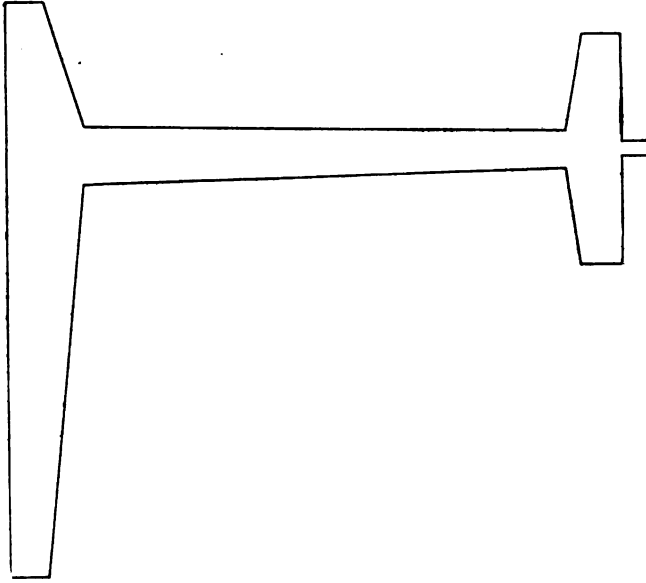


Fig. 19.—Diagram of piece of plate zinc used in making bipolar negative electrode.

trode (described below) is connected with the negative binding post by means of a piece of No. 26 wire.

Bipolar Negative Electrode.—When first employing this method the author used an old-fashioned disk electrode held against the center of the growth by a nurse. This was found to have two disadvantages: In a heavy application the flow of hydrogen-laden, alkaline, frothy liquid is so great as to obscure the work and even to scald healthy skin on which it might flow. The fixation of the electrode in its soapy situation was, moreover, uncertain, particularly when the attention of the nurse wandered.

For external applications, therefore, the self-retaining,

cation-absorbing, negative electrode shown in Figs. 19 and 20 was devised. This is conveniently made of either of the thinner sheets of zinc of which minor electrodes are made (the nature of the metal being, of course, indifferent, as the negative pole will not drive metals inward), by cutting out with a pair of shears a piece shaped as shown in Fig. 19 and of a size suitable to the growth to be destroyed. This is curved to form a spiral at the larger end, the shank being then bent to the exaggerated resemblance of a spoon, Fig. 20, but with the edge of the spiral pointing downwards, to be placed in contact with the center of the growth. After attach-



Fig. 20.—Negative electrode of bipolar cataphoric operation in external situations.

ing the conducting cord to the small tip at the opposite end, the shank is completely and heavily insulated by covering it with melted sealing wax. A strip of thick gauze is now inserted between the turns of the spiral, and it is nearly saturated with a mixture of equal parts of sulphuric acid and water, which, resting on the center of the growth, will absorb the cations of the tissues as they reach the electrode thus securing a practically dry application. The instrument is so placed that the insulated shank will rest on healthy skin beyond the field of operation, and it is secured firmly in place, with

slight pressure on the tumor, by means of strips of adhesive plaster passing over both the end and the arch of the shank.

During a prolonged or heavy operation the acid becomes neutralized, shown by the appearance of froth, and may be added to the gauze from time to time by means of a glass dropper.

Within cavities, if the growth be large enough to make the bipolar operation feasible, a spade-shaped electrode (Fig. 16) may be prepared to act as the negative pole by covering it with cotton, kept moist with the acid, and pressed into the center of the growth.

The active electrodes are similar in every way to those employed in the monopolar operation described in a preceding paragraph, and are used in a similar manner, except that greater care should be used in inserting them beyond the periphery of the growth, if possible, and that more of them may usually be employed simultaneously on account of the far greater current that it is possible to use in a bipolar application.

About twice as much current may be employed in the several portions of the body by the bipolar method as compared with the monopolar, with even less influence on the reflex centers, thus greatly reducing the time during which the patient is kept under the anesthetic.

Should it be thought wise to follow the bipolar with the greater peripheral diffusion of a moderate monopolar application, after the completion of the former, the current is turned off, the central negative electrode is removed, and the wire from the pad connected instead with the negative binding post, a gentle current being turned on and maintained without further increase of the anesthesia.

After a bipolar operation with a heavy current, it should be remembered that the central portion of the slough is simply necrosed by electrolysis, and is, therefore, more likely to give rise to odor during separation. The periphery will show full infiltration with the zinc-mercury ions.

AFTER CARE OF PATIENTS FOLLOWING CATAPHORIC OPERATION.

During Separation of Slough.—The after treatment of a patient who has received a major application of electrochemical sterilization is extremely simple. Pain is rarely felt

after emergence from the anesthetic in large growths, particularly if they were painful prior to operation, though soreness or tenderness will last for several days. In smaller growths, where much of the chemical effect has been expended on healthy surrounding parts, enough pain may be experienced during the first twenty-four hours to render a small dose of morphia desirable. The puffy reaction beyond the zone of sterilization may also at times render cold compresses useful.

The first dressing may be left on for twenty-four or forty-eight hours, as the site of the application is dry and will remain so for some days. The infiltrated ions have rendered the field of operation practically sterile, and this condition will persist for about fourteen days. During this time the line of demarcation is in process of formation, and the serous discharge will later demand more frequent changes of the gauze dressing, even though no odor appears. Where the slough is large, and has been formed from a growth in a necrotic condition, the antiseptic salts may drain away during the third week in sufficient quantity to permit a reappearance of a modified odor, though such an odor is never more than infinitesimal compared with the previous emissions of an ulcerated growth. To prevent this reappearance of odor in such a case it may be well to cover the crust with a powder made of one dram of carbolic acid rubbed up with a quarter of a pound of powdered oxide of zinc, or the devitalized part may be kept covered with a moist bichlorid dressing.

The slough will separate spontaneously on or about the 21st day, if the growth was external and largely fibrous, or from the 7th to the 14th day, if the growth was soft and composed mainly of the neoplastic cells. When bony structure has been invaded by the growth it is a participant in the necrosing effects and will separate from the healthy bone also spontaneously in from 13 to 26 weeks. When the slough is large, whether of soft parts or bone, it may harbor germs of decomposition by re-infection during the latter portion of these periods, after the deposited chemicals have in part drained away, and it may, therefore, be wise to cut away the greater portion of the slough before it separates, for the patient's greater comfort, but in no case should the natural line of demarcation be interfered with, the cutting being done in the dead tissue only.

Secondary Hemorrhage.—In those growths where the line of separation forms early and occurs in highly vascular tissue, and particularly when it occurs in diseased tissue as a result of incomplete operation, there is some danger of secondary hemorrhage at this time, due to incomplete closure of the vessels. This may be said to be almost the only danger attending cataphoric operations, and it is best prevented in certain localities, particularly in large carcinomas of the upper or lower jaw, by subjecting the patient to the operation of ligation of the main artery supplying the part, the operation being performed about two weeks before the carcinoma is destroyed by cataphoresis and being done in healthy tissue; though at times both operations may be done seriatim, with the one anesthesia. This precaution is seldom required outside the localities mentioned, however, the time required for the physiologic separation of the slough being usually sufficient for the spontaneous closure of the smaller vessels.

In cases where more or less hemorrhage is feared on account of the probable inclusion of vessels abnormally enlarged in the neoplastic growth, a careful watch should be maintained on the patient from the 7th to the 16th day after operation, or until separation has occurred, the patient being meantime kept at rest in bed, and no traction should be made on the slough until the vessels have been occluded by the natural process. Should this rare accident occur, nevertheless, the best treatment is the immediate application of a bichloride compress of sufficient thickness to exert firm pressure on the bleeding vessel when held in place by a tight bandage. When the bleeding is thus controlled the compress should be allowed to remain in place for several days. If the site of the hemorrhage be within a cavity, such as the mouth or rectum, a small quantity of Monsell's Solution, to which 3 per cent. of carbolic acid has been added, should be applied to the bleeding point with a glass syringe or on pledgets of cotton, and allowed to remain for several days.

After Separation of Slough.—When the slough of an external wound has separated spontaneously, or by the final clipping of devitalized fibers, a painless excavation is revealed in which granulation should be fostered and stimulated, with such exclusion of foreign germs as is possible without interference with the granulation process. Such a surface does

not heal kindly under granulation—destroying dry gauze, even if the gauze is scrupulously sterile, while antiseptic solutions are equally irritating. The author has found, after much experience, that the best dressing for the wound at this stage is a mixture of equal parts of zinc-oxide ointment and vaseline. This exerts a gentle stimulus to the granulating surface, while protecting it from contamination, and favors the filling of the cavity and the inward extension of new skin from its edges in the shortest possible time. Later, the zinc-oxide may become too stimulating, shown by excessive redness of the granulations, when it should be replaced by a 20 per cent. mixture, or simple petroleum ointment until the part has skinned over.

Appearances indicate that these wounds, so treated, heal with remarkable promptness compared with wounds otherwise produced, rarely requiring skin grafting even when large surfaces are denuded, and resulting finally in soft scars of extremely small area compared with the original wound. The general tendency is the formation finally of a simple linear or Y-shaped scar, of slight conspicuousness, the only disadvantage being a tendency to distortion of the mouth or eyelid when the wound is very close to either of these openings. In the latter case a plastic operation may be resorted to later for cosmetic reasons.

A few days after the separation of the slough the daily critical observation of the wound should begin, to discover any evidences of a portion of the growth having escaped the destructive process. The characteristic appearance of these disease granulations is somewhat difficult of description, but it may be said that they are larger, rounder, harder, and paler than normal granulations. When disease is left in the edges of the wound the latter are almost invariably raised, hard, and usually excavated (though at times rounded), while healthy edges are flattened, continuous with the surrounding skin or mucous membrane, and show the bluish-white color of new epidermis.

In the presence of any reasonable doubt, the granulations should be attacked at once by a series of minor applications, which are quite painless at some distance from the edges of the wound. If the edges themselves are doubtful, a second major application should be arranged without delay.

THE MINOR APPLICATION

The minor application of zinc-mercury cataphoresis is the designation applied to all applications made without general anesthesia. Any form of local anesthesia may be used. They may be made at the office, in the hospital or dispensary, or at the patient's residence.

The apparatus required is a current source and applying mechanism equal at least to the ordinary demands of the constant current in gynecology, having a good graphite controller of approved pattern and a delicate and accurate meter registering to 100 milliamperes on a wide scale. The Cataphoric Table, the Massey Wall Cabinet, and the improved portable apparatus described in connection with the technic of the major application, present almost equal advantages in the minor application, the chief being the very gradual and painless turn-on possible with them.

The patient lies on a couch with the part to be treated exposed, and the clothing is loosened sufficiently to enable a kaolin pad to be placed on the abdomen or back.* On the side of the pad furthest from the skin the thin metal plate is placed, of appropriate size, and connected by a No. 26 wire with the negative binding post. The next step, if the site of the proposed application is external, denuded of skin and sensitive, is the placing of several drops of a strong solution of cocaine at the site of the puncture, dropping a minute bit of absorbent cotton on it to hold the solution in place if necessary. This will serve to benumb sensation very materially if left in place while the active electrode is being prepared.

The minor electrode is now prepared as described above, sharpened and attached to the piece of No. 32 copper wire to serve as conductor. If the tissue to be destroyed is beneath healthy tissue, and a sinus exists, it is insulated as described for the No. 2 electrode. Should the surface to be destroyed be large, several such electrodes may be attached to the leash of wires described, but more than one electrode is only employed in situations where enough current can be used to give each point from seven to ten milliamperes, at least.

The electrode or electrodes are now amalgamated, attached to the positive binding post of the battery, and gently inserted into the growth, care being observed to make the pressure of insertion vertical to avoid breaking the instrument, which is now quite brittle from its mercurial coat.

Perfect stability of the electrode in the position given it is best secured by attaching a guy of adhesive plaster to the

* When the application is below six or seven milliamperes the kaolin pad may be placed on a table and contact made by the patient resting the palms of the hands on it while in the sitting position.

wire about four inches from the electrode, and sticking the ends of the plaster to a neighboring skin surface in such a way that the wire itself will not rest on the skin, since its insulation is slight.

The electrode or electrodes being in position and incapable of being disturbed by slight movements of the patient, a current is slowly and gently turned on, to the limit of the patient's comfort. This will vary greatly with the sensitiveness of the part, and should also bear some relation to the quantity of metal capable of being attacked without disappearance of the point during the application, thus suddenly interrupting the current. In practice the limits will vary from 2 or 3 to 80 or more milliamperes. Judged from the point of view of current bulk and electrode surface, there should be some adjustment of the size of the points to the current, as the most effective results are attained when the points are nearly, but not quite, dissolved during the application. With small currents, very fine points should therefore be used.

A minor application for malignant disease should continue for thirty minutes, invariably, when one of a series with others to follow, counting from the time when the current is turned on. In tuberculous deposits fifteen minute applications will be sufficient. The current should be turned off as slowly as it was turned on, as any sudden variation is painful.

The part is dressed with the half-strength zinc-oxide ointment on gauze, held in place with a bandage or strips of zinc-oxide plaster.

The minor application is quite effective in destroying small growths in one séance, if the growths are not situated in sensitive regions, the part being duly inspected after separation of the slough and the application repeated until no doubt of the destruction of the growth exists. In larger growths of low malignancy it will maintain a practical asepsis, and if repeated daily or every other day, may ultimately eradicate the whole of the diseased area.

Local anesthesia may be employed with this method in two ways. If the skin must be punctured for the insertion of the electrodes, it should be chilled with the chloride of ethyl spray. A straight Hagedorn needle makes an excellent bistoury for incising the skin. When the electrode has been inserted, a small drop of a strong solution of cocaine in water is placed on the opening alongside the needle; the cocaine in the solution will be carried by cataphoric action into the wound along with the zinc and mercury ions, doing much to lessen the burning sensation that develops at the point where the ions attack the skin. When the puncture is into granulations at some distance from the skin, neither the spray, Hagedorn needle, nor the cocaine will be necessary, as diseased

granulations are quite insensitive and easily penetrated by the zinc needles.

A more extensive local anesthesia may be produced when considerable skin surface is to be destroyed by using the endermic injection method; but where cocaine is to be thus employed, it should be in the weak Schleich solution, which contains morphia, cocaine, and common salt, and may be freely injected into the skin itself.

The No. 1, or non-insulated electrode, should be used when a sinus is to be created through healthy tissues for subsequent treatment, and when the growth is a surface one and therefore does not require that the instrument be insulated. The No. 2, or insulated electrode, is to be used when further action on the walls of a sinus is not desired, and we wish to confine the action to the underlying tissue alone.

Value of Zone of Reaction produced by the Minor Applications.—Daily diffusions of even moderate doses of the ions of mercury and zinc are often practicable in somewhat large growths of low malignancy, such as rodent and other slowly growing epitheliomas, and in these cases both the operator and patient become soon convinced of the reality of the zone of reaction by unmistakable signs. Under these applications, with needles at each application passed into the insensitive growth itself, a sense of discomfort and burning will be perceived by the patient in the edges of the growth in a few days that can only be explained as the result of the repeated transmission outwards of the ions diffused at the previous applications. The physical conditions are that of concentric waves of material diffusion from the electrode or electrodes, each wave halting in its outward progress at the termination of the treatment, but being started up again by the next one. After ten such applications, therefore, the eleventh will be found to start up ten radiating waves of diffusion due to previous applications, the density of the ions diminishing as the circle of the wave widens, with consequent weakening of effect towards the periphery.

This secondary effect of such frequently repeated applications is often quite notable in surface growths, such as those mentioned, leading finally to a complete reversal of the insensitive conditions prevailing in these growths. The surrounding tissue becomes reddened and tender. The arousing of the physiologic resistance of the tissues thus indicated cannot be other than of great service in the destruction of outlying malignant cells, and thus contributing towards ultimate cure, but when the growth is too large or too virulent for this process to overwhelm it, the reaction only increases the virulence of its growth. In such cases a major application should be used without delay.

IS RADIOGRAPHY IN COLORS POSSIBLE?

BY J. RUDIS-JICINSKY, M.D., CEDAR RAPIDS, IA.*

As the value of the application of the Roentgen rays in surgery and medicine, in diagnosis and treatment, is not only important, modern, and progressive, but absolutely infallible in individual cases, if properly handled, it should engage the attention of the profession at large with all the variety of opinions as they are entertained of the true character and proper results. There is no question about it, that radiography, to-day, is the greatest help to diagnosis. This photography of the invisible gave us the best method of obtaining a correct and true representation of many things that have formerly been obscure in the lesions of the living body, and enables us now to produce pictures excelling in features of detail any painting ever placed on canvas with a brush, giving us not only the shadow, but the substance also, of the internal structure with beautiful depth and perspective. Such was our honest opinion five years ago, and proved at that time with many radiographs of real diagnostic value what could be done, in the photography of the lungs, the stomach, the intestines, gall-bladder, kidneys, bladder, and even the head, as well as the lesions of the bones, joints, with foreign bodies, in comparative anatomy, medico-legal cases, lesions of different cavities etc.

With the knowledge in physics, chemistry, anatomy, physiology, pathology, and the knowledge of illuminating and posing the subject, we have now the opportunity of studying our negatives much better. With better technique and better apparatus we are also able to do more satisfactory work.

To be content and satisfied is not the motto of science. Progress is the motto of art! And to obtain clear representations by instantaneous exposures, or by any other means giving us still more detail, or the *status præsens* in a living subject, as the lesion itself should appear in colors, if possible, is the latest step in this new branch of medicine and surgery—in this art of ours.

Is direct natural color possible in radiography also? What advantages would we have, if so? The muscles appear-

* Read before the Iowa Union Medical Society, at Iowa City, Ia., June 23, 1908.

ing in their natural color, the "blood supply" of the same showing in red, and the bones white, with the organs, as the heart, in scarlet, the details being of the most beautiful and light shading with those of darker quality. A living picture of a living subject with all the secrecies of Nature and otherwise invisible to the human eye in the internal parts of the human anatomy, physiology and pathology perhaps gold appears in yellow, silver blue and iron black.

We have made some experiments in this direction with the Lumière autochrom plates especially adapted for the work of this kind, and found that even in radiography, nothing is impossible. This wonderful discovery of these special plates, by which color photography is made an absolute certainty, has struck the world with awe and amazement, and we, the humble servants of science, can demonstrate also some of the future possibilities in our line with these plates. It remained for the house of Lumière to crown their best efforts with their wonderful invention, and for us, being in constant touch with them and their laboratories, to find out how much we can gain with this new method of photography.

Not developed, not complete? Certainly, but what in the world is complete to-day? The times call for work of high order, and further research and further experimentation. Judgment, study, and careful execution must be our aim. The correct reading of the shadows of our new pictures, as shown, is not always an easy task, but the detail in the diapositive-*prints cannot be made as far as desirable yet*—but it seems to be nearly perfect, especially when the development of the plate is made in a covered tray, or in complete darkness.

The *exposure* in this case differs from the usual one, the autochrom plates being exposed on the glass side, the rays therefore must go through the glass before reaching the sensitive film, and being filtered with the special yellow glass screen of Lumière, have to be divided on account of the penetration with our own filter, made, especially for this purpose, of aluminum. A lead plate placed under the special photographic plate with the film protected with cardboard, seems to concentrate the rays properly for rendering of correct colors. The autochrom plate for our purpose is exposed without frame in yellow envelopes, not black ones, but care must be taken not to expose the plates even to the red light of a dark room.

They are very delicate, and the exposure instead of seconds, even with heavy coils, and the best Crookes tubes, must last for 10-15 minutes, according to each individual case, and the part taken. The ray filter is placed over the autochrome plate and our aluminum filter as near as possible to the tube. The exposure proper and the unloading of the envelopes should be done in a dark room only, and we have to be very careful to avoid scratching and exposing the plate even to direct dark-room light.

The *development* is special, certainly, lasting but a few minutes, and is then followed by second development with dianol to reduce the silver. This procedure is done in broad daylight, from the moment the permanganate solution for coloring purposes is poured on, as well as all further manipulations, as intensification, clearing, fixing, washing, drying, and varnishing. The last step is done in order to increase the brilliancy of the image and insure its preservation.

The *modus operandi* with the exposure of a subject is about the same as in general radiography, with the exception that we have to work in the beginning in a completely dark room, and certainly we may have an under- or over-exposure, fog, black, streaks, dichroic fog, spots, or a blue image, which last means either: that the yellow glass ray filter employed has not been correctly placed, or that the plate was not properly protected. This blue coloration may also happen, if the filters are not large enough—not covering the whole Roentgen field. If we wash the exposed plates too long, a decrease in the colors and general reddish tinge may follow. A varnish pellicle under the sensitive film may give green and ugly patches, spoiling the image proper.

To get good results, the plate must have a layer of clean varnish first applied and then covered with a mixture of starch grains of three fundamental colors: red, green, and blue. This mixture has a gray appearance. The average diameter of these minute grains is about $\frac{1}{10}$ to $\frac{1}{100}$, m.m. to 1 m. and in number 700 to 900.

The film so constituted is covered over again and again with a constant flow of bromo-silver during its production. The emulsion employed has been greatly improved, and is now very soft and delicate giving fine gradation and detail, better with every step, towards a finer grain. There are plates on the

market sensitive to green and yellow, yellow and red, green, yellow and red, but they will not give us such strong contrast and deep shadows as we require for our work.

The Roentgen rays being the rays of light, beyond the ultra violet of the spectrum penetrate through the grains of the harmonious colors, in the special film of the photographic plate, and at the opposite grains illuminate the bromide, which during the development coagulates and forms metallic silver; in this way we get a negative of colors, which has not the colors of the subject. Such a plate is removed after the first development and brief washing as above explained, into the permanganate solution with acidi sulphurici. After two to four minutes the reduced black silver is dissolved and the colors may be seen by looking through the plate. The plate is then rinsed in running water for thirty to forty seconds. The second development is to be done with a non-alkaline developer and a proper intensification of the plate to brighten the colors for contrast follows.

If we care to produce color effects for comparative study of anatomy only, we may simply use a given negative, expose the same to a flashlight in a dark room and produce in this way a most beautiful diapositive, with all the details obtainable. No retouching is allowable. The background of the diapositive is covered with any kind of heavy substance (as enamel), and the whole is then given a good and thorough bath in a solution of potassium permanganate. The bath itself lasts for about four or five minutes, rinsing in cold water then following, employing a temperature of about 65° F. Dry the diapositive thoroughly and make a print if you wish to, which will serve to you as a corroborative evidence that your original negative was properly made when the lesions show in two different colors. First as a shadow and then as a substance itself.

The whole procedure is very simple, and it is to be hoped that in the near future we will be able with the use of oxychloride of bismuth, photographs to not only show the size and form of the stomach, but any lesion where there is a marked congestion, pus in the cavities, or some destructive process, especially in the lungs and other organs in natural colors; colors as of life, affording opportunities for the study of comparative anatomy and other scientific questions concerning human life..

Editorial.

THE ATTITUDE OF THE NEUROLOGISTS TOWARDS PHYSICAL THERAPEUTICS.

THE following suggestions were recently made in an editorial by an associate neurologist in the Jefferson Medical College: "The therapeutic armamentarium in neurological practice is very meager. Organic nervous diseases are incurable because of the complete destruction of the fine nervous elements, and because of the impossibility in the majority of cases, of regeneration, and that functional nervous diseases are very rebellious to treatment, because of a special and great susceptibility of the nervous system to dynamic derangements."

While statements as to the pathological conditions may be true, in advanced stages of nervous disease; with the early recognition of these disturbances in the hands of those who are familiar with physical therapeutics, there is no justification for the suggestion that the therapeutic armamentarium in neurological practice is meager. The writer, however, inclines to investigate one of the less important subjects in therapeutics, "Bier's hyperemia," and points to the fact that there is much to expect from it. If the neurologists in general will investigate the physiological effects and therapeutic indications of the high potential electrical currents, light, the Roentgen-ray, and mechanical vibration, and employ them in accordance with the modern methods in experienced hands, the neurological therapeutic armamentarium will be so enriched that a large percentage of nervous conditions, which are permitted under the present régime to go unrelieved, would be cured in their early stages. It is probable that other than favorable results obtained from the employment of physical therapeutics are by those who take the work up in a desultory way, without due regard to the indications and methods of employment. The time necessary for the accomplishment of effectual results, and the labor required are such, that too many of the specialists find their employment too great a task for them to undertake and therefore neglect them.

For such there is a day of reckoning; for those who daily demonstrate the efficiency of these things are prepared to as-

sert from the multitude of results that the therapeutics is not meager, but rich in possibilities when conscientiously employed by those who are familiar with them.

* * *

THE RESPONSIBILITY OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

IN these days of skepticism and therapeutic nihilism, when the profession at large are wavering between drug-therapy, surgery, and suggestive therapeutics, means which are unable to cope with physical derangements, obstructive in character, for which such measures are but feebly indicated, the necessity for enlightenment in lines of treatment which *are* effective in coping with these conditions is demanded in the interest of suffering humanity. Until such time as the efficiency of physical measures in the treatment of a large range of physical conditions in which the other measures, referred to, have been ineffectual, are recognized by the profession at large, the duty devolves upon those who *are* enlightened as to their value and the necessity of their employment to bring them to general recognition. The results obtained with these measures in the treatment of conditions not otherwise relieved are causing the members of the profession who are not informed as to the methods and indications for their employment, either to consider them an impediment in their path, because of the success obtained with them, or if more honest and scientific leads to a recognition of the importance of their consideration and investigation.

Very few indeed of those who take up the use at first of the physical measures do it in a really scientific way, which often brings discredit and want of confidence with both patient and physicians. It must be borne in mind that, it is not the thing that is used that effects the favorable result unaided; and no greater mistake is made than to suppose that these modalities can be employed without first understanding the proper knowledge of their indication and methods of employing them.

The membership of the American Electro-Therapeutic Association is composed of men who have generally made or are

making diligent research into the important principles and methods and are therefore best qualified to set the pace for their employment by the profession at large, at least in this country, where they are most used. The duty then of enlightening others devolves upon the membership; and it is earnestly to be hoped that in the movement now on foot for standardizing the methods of employing these measures, in a definite and scientific way, that a thorough exposition of the indications for each modality, as well as an outlined direction as to dosage, and frequency of treatment, will be successful in giving to the profession an accurate basis for their employment. If the Committees having in charge the evolution and designation of the physiological actions and therapeutic indications, and other matters pertaining to the employment of these measures, enter with energy and determination upon the task of elucidation of these important questions, it will result in advancing their general introduction and recognition by the profession at large.

* * *

THE EIGHTEENTH ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

THE Eighteenth Annual Meeting of the American Electro-Therapeutic Association will be held at the Engineering Building, 23-33 W. Thirty-ninth Street, New York City on the 22d, 23d, and 24th of September, 1908.

The fifth floor of this remarkable building has been secured with spacious exhibition hall and auditorium. Preparations are in hand, which promise to make this the greatest meeting in the history of the Association. Dr. Edward Titus, 127 W. Eleventh Street, Chairman of the Committee of Arrangements, and Dr. Wm. Benham Snow, 349 W. Fifty-seventh Street, will respond to any inquiries made.

The headquarters of the Association will be at the Hotel Astor, Broadway and Forty-fourth Street, five minutes walk from the Assembly rooms. Terms have been arranged at from \$2.50 up. Members are requested to go directly to the Hotel on their arrival in the city.

**PRELIMINARY PROGRAMME FOR THE
EIGHTEENTH ANNUAL MEETING OF THE
AMERICAN ELECTRO-THERAPEUTIC ASSO-
CIATION.**

THE following preliminary programme has been announced for the next meeting of the Association.

1. Observations upon the Employment of Caldwell Tubes in Surface Work, by Dr. C. R. Dickson, Toronto, Canada.
2. Septic Arthritis Due to Chronic Urethral Strictures with Various Kinds of Infection, by Dr. J. Walter Torbett, Marlin, Texas.
3. Correction of Flat-Foot, by Dr. Herbert McIntosh, Boston, Mass.
4. Physical Treatment of Tuberculosis, by Dr. Chas. O. Files, Portland, Me.
5. Several Variations of the Morton Wave, by Dr. Geo. D. Bond, Fort Worth, Texas.
6. The Treatment of Arterio-Sclerosis and Hypertention, by Dr. William Benham Snow, New York.
7. Electricity in Errors of Refraction, by Samuel J. Harris, Boston, Mass.
8. Tuberculosis and Its Treatment, by J. D. Gibson, Denver, Colo.
9. The Treatment of Reynaud's Disease by Physical Therapeutics, by T. Harris Cannon, Baltimore, Md.
10. Roentgen-ray Diagnosis of Diseases of the Bones and Joints (illustrated with lantern slides), by Mihran K. Kassabian, Philadelphia, Pa.
11. Treatment of Varicose Veins and Varicose Ulcers with the Static Wave Current, by H. Finkelpearl, Pittsburg, Pa.
12. Gout: Its Treatment by High Frequency Currents, by Frank A. Davis Boston, Mass.
13. New Possibilities of the Electric Light Bath, by T. D. Crothers, Hartford, Conn.
14. The General Practitioner, His Own Radiographer, by E. Gard Edwards, La Junta, Colo.
15. The Leucodescent Lamp, A Case in Practice, by S. T. Birdsall, Glens Falls, N. Y.
16. A paper (title not given), by J. H. Kellogg, Battle Creek, Mich.

Members who wish to have their papers appear on the programme of the meeting, must send in their subject to the Secretary before the 10th inst.

Progress in Physical Therapeutics.

CURRENTS OF HIGH FREQUENCY AND HIGH POTENTIAL.

EDITED BY WALTER H. WHITE, M. D.

Fulguration in the Treatment of Cancer. By Dr. Keating Hart. Translated from the Archives d'Electricité Médicale, for June, 1908.

Fulguration was a name suggested by Professor Pozzi, and consists really of an electro-surgical treatment of cancer.* The electric spark of high frequency and high tension as used by this means in the treatment of malignant diseases, which would be powerless entirely by itself to destroy them, or to make it disappear by innumerable applications or extremely long time, the time element being dangerous by causing weariness.

The writer observes that electric intervention ought doubly to excel surgical intervention but does not seem to consider it so, except in combination with the latter in the therapeutics of the cancer. Then follow the details of the combined uses of fulguration with the employment of the knife.

The *operation* is always done under an anesthetic with the combination of both the surgical and electrical means in the same operation, the danger of ether being warned against from the use of sparks. The principle of treatment is the employment of the apparatus in connection with a Oudin resonator, attached to an efficient coil apparatus capable of throwing a spark of 40 centimeters, employing either the *unipolar* or *bipolar* method; with the preference for the unipolar method on the part of the writer. The bi-polar method, however, is relatively more destructive, but in many cases is difficult of application; particularly under some conditions of its depressing effect upon the neighboring vital organs.

Whether unipolar or bipolar the sparks cannot be carried into the diseased regions and limited expressly at the points where one wishes to strike without the help of specially constructed electrodes. With the instrument employed, a hollow cylinder is joined to a conductor through which the current is flowing, which slips easily in an insulating tube of thick ebonite, made in different forms for the cases in which it is to be employed. The outer end of the conductor is marked perpendicularly by a number of marks in centimeters and the other

* Previously named *Effluviation* by Revière.—EDITOR.

end is inserted in the ebonite tube. As the ebonite tube slides from the extremity, the marking of the other extremity indicates the length in centimeters of the spark that is jumping between the electrode and the patient. As the passage of the column of air with the spark heats the tube, the writer has had the electrode so constructed that through the interior of the electrode under pressure air is forced blowing away the perspiration from the surface of the patient, as well as the heated air, thereby getting rid of the added heat effects. To the distal end a tube of rubber is attached, from a tank of compressed air or CO₂, which both cools the electrode and removes the heated air and perspiration from the surface of the patient. It is desirable during the operation to make use of a wooden instead of a metal table for obvious reasons. Care must be exercised in the use of the anesthetic, ether and ethyl chloride being particularly dangerous.

The spark employed possesses great contracting power and by its continued action upon the cancerous masses, it tends to mortify them in their density, and facilitates when diseased tissue is present in separating the healthy part from the other. The first sparks administered in the writer's opinion have an added advantage in diminishing capillary hemorrhage and by sheltering the little vessels, lessens the chances of reinoculation, and also limits further surgical intervention. The writer found that by this method he is able to succeed with more serious operations, it giving him new hope from the results of this technique.

To treat surgically malignant neoplasms, as simple tumors, that is to say, to remove from them the diseased or vegetant mass, or it may be said, the microscopic lesions, by following very closely the outline of the knife, scoop, or scissors, is to-day what I expect from the surgeons who operate with me.

Professor Czerny has well said "finish first the worst surgery, and then let the spark do *its* work." The technique must vary with the conditions of the individual case. Careful attention must be given to the surface of the growth and the parts further off as well, in order to successfully remove all the aberrant nodules, so frequent especially in the cancer of the mucous surfaces. The removal of the small wounds, not alone, are required or but one is obliged to watch for a length of time for recurrence of the disease and fulgurate the nodules which are more or less distant, and which may have escaped either the knife or the spark. This one is obliged to do as a safeguard, and might have been done nearly constantly without having given surgery the place which it holds in the method as employed to-day.

The advantages gained about this tissue destruction in connection with surgery, from experience, is triple:

1. It reduces often to a single operation the number necessary to obtain a cure.
2. It diminishes the length of the electric application.
3. It spares the patient already weakened by the kind and degree of the disease, a long elimination of a mass of destroyed tissue and associated weariness when removed by the spark alone.

One cannot say that it is surgery which caused the cure, and not electricity, because to remove a cancer with the knife, far from curing it, gives it only a new malignant form and the surgeon would be indeed very capable if it was true that this limited intervention was sufficient. The part which surgery plays in fulguration is only elementary and not curative.

After the removal by the knife, the electrical treatment is the most important; the one to which the ultimate cure is due.

Only personal experience can determine the length of spark and the length of time necessary for this application because the cases are multiple and diverse, and we do not possess any scientific means of measure, for currents of high frequency. Different apparatus produce different intensity of spark; also the character of interrupter and the capacity of the condensers, the quality of the discharge are variable.

The stanching of the blood induced by the spark takes place in the artery or in the vein as the effects of vaso-constriction. It is by the stanching of hemorrhage that the action of electricity is appreciated. In the technique for arresting hemorrhage, the current is required to be carried carefully over all the sectional surface and in the inmost recesses, when the result is almost certain.

After a certain length of time of sparking the wound surface is covered by a dark layer which is liable to come off by the least rubbing. It is rational to suppose that this layer, while forming over the mouths of the capillaries, closes them little by little and thereby retains the blood, which is liable to escape without much force.

Upon the duration and intensity of the spark employed, and the amount of the tissue necessary to be destroyed, will the duration of the application depend, bearing in mind that the unipolar spark is not as destructive in its action as the bipolar.

The guide in the extent of fulguration induced will be the induction of a dry scar and the commencement of a bad smell due to the burning effect upon the tissues, from the action of the spark. This burning, due to the intense heat effect, is best controlled by the gaseous wind from the compressed air or CO₂ tank previously described, whereby the surface is kept cooled during the application. It is this combined effect, undoubtedly, which induces the formation of the fine covering of the blood clot previously described.

When following the removal of nodules, a recurrence takes

place, at the first manifestations wherever they may appear, they should be again treated with energy.

Following the operation the healing is generally rapid. The knowledge of the character of the action of the sparks upon the healthy or diseased tissues is still in question. Various views have been given and contradicted. The writer states that he has himself commenced a series of researches with a view to discovering these actions. As previously stated, the effects are vaso-constriction and cellular destruction which is more or less superficial. The vaso-constriction has no anti-cancerous therapeutic effect, but diminishes the chances of re-absorption by closing the vessels and narrowing the tissues. The cellular destruction is necessary. In spite of the unidentified aspect of the tissues which are reached and their vitality impaired, the secondary destructive action is also very limited; but as the neoplastic tissues are generally more fragile than the others, the effect upon them of the action of the spark is more profound, as has been clinically demonstrated. In fact, in many instances the more remote neoplastic tissues which is not brought directly in contact with the sparks, cease developing, and recovery takes place after fulguration, not of the principal growth alone to which it is applied but of remote parts, which can be only explained on the theory that the effect is to stupefy them by counter-blows.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

Experimental Researches on Kromayer's Quartz Lamp. By Prof. H. Bordier and Prof. T. Nogier, Archives of the Roentgen ray for July, 1908.

The writers of this paper look upon the quartz lamp of Kromayer as a modification of the Cooper Hewitt lamp. The constructive feature of the lamp consists in its shape, which is that of a short letter "U," and the fact that it is made of quartz, thereby not cutting out the ultra-violet rays as the glass lamps of the Cooper Hewitt and Uviol type do.

This particular lamp uses a current of three to five amperes and 100 to 140 volts. It is so constructed that a current of water circulates through the outer case in order to keep the "U" tube cool. The peculiarly livid, blue light which emanates from the lamp, modifies the color of all objects illuminated by it. Complexion appears livid, and the lips black; all other of higher frequency and the green tints are re-enforced, while orange and red become a deep lilac or dark violet tinge. The writers call attention to a peculiar odor which is

produced in the irradiated air which they conclude after various tests and experiments but do not demonstrate, is due to the ozone which is present in infinitesimal portions. After many tests it was remonstrated that the Kromayer lamp emits but few heat rays. After various experiments the writers profess to have demonstrated that the lamp produces the heat of the temperature of the body at a distance of 28 millimeters from the quartz window, and suggest from their point of view that for the ultra-violet effect alone it be employed at a distance of 30 millimeters; disregarding the generally conceded value of the heat rays. At this distance, however, it should only be used in their opinion, in superficial lesions such as acne, syccosis, eczema or psoriasis because the action of the lamp in contact is much deeper, especially if we employ pressure so as to empty the blood from the superficial tissues.

The bacterial action of this lamp, as compared with the Cooper Hewitt, is intense; whereas the action of the Cooper Hewitt is practically nil.

The writers claim for the irradiations of this lamp some remarkable effects upon living tissue. From 15 seconds to one minute contact exposure produces an enormous inflammatory reaction. The redness and swelling may not appear at once, but is followed by swelling of the whole of the surface corresponding to the position of the quartz window. After three days the epidermis became raised, and a serosity appeared under the thin layer of epidermis, just as if blistering fluid had been applied, and was followed by severe itching. The fluid was discharged and the epidermis reformed below the blister. In the case of the shorter exposure of fifteen seconds, the blister healed in twenty days, but it was delayed to thirty days for the longer exposure of one minute. The longer exposure was also followed by a diminished sensibility of the skin when compared with the shorter exposure.

The writers call attention to the fact that the dermatitis produced by this lamp differs *in toto* from the x-ray dermatitis, but fail to record any reason for this difference; whereas it is a well recognized fact in this country that the dermatitis of ultra-violet light is the result of over stimulation; whereas that of the Roentgen ray is due to extreme inhibition. While these experiments would show a great intensity from reaction from short exposures, the writers have not undertaken to prescribe any definite dosage for this application of light, but close the article with reference to its importance and therapeutic actions.

A point of particular interest was the early demonstration of various eruptions, which seem to indicate its use as a *diagnostic* measure. The eruptions of scarlatina and variola may be recognized several hours before they are visible by daylight or lamplight. These gentlemen are not able to contribute from

any experience to the therapeutic value of this lamp, but report that it has been used with success in a number of conditions.

[The paper's value, therefore, from a clinical point of view is not great; in fact, we are led to look upon this new therapeutic lamp, as giving forth irradiations of great intensity, and capable of producing profound local effect which may be found adapted to the treatment of conditions calling for bactericidal and local hyperemic effects; it is very doubtful, however, if it will equal in value the combined radiations of light and heat, except in superficial skin affections. EDITOR.]

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Roentgen Treatment Far Below the Surface. Jour. A.M.A., July 18, 1908.

Desauer suggests that it is possible to act effectively on very deep seated conditions by exposing them to the ray from several tubes at the same time from different points. He advises that one tube be focused in front and another at the side and still another at the back. The rays would all cross in the tissues to be treated while the skin on the different sides would only be exposed to one tube. Another point he emphasises, is the longer the distance between the tube and the lesion treated, the less is the absorption of energy in the superficial structures. He describes some technical improvements along these lines and claims success equal to that obtained in superficial cases.

Roentgen Ray in Epithelioma. By William Allen Pusey, M.D., Jour. A.M.A., February 11, 1908.

In this paper the writer reports 111 cases of epithelioma all treated for over three years. He also shows the photograph of 15 cases before and after treatment. There were after three years 80 cases that were completely successful, beyond question or cavil, 2 cases practically successful, 17 cases greatly benefited and 12 failures. This synopsis of the 111 cases of epithelioma of all degrees of severity that come into one office for x-ray treatment is certainly remarkable and proves beyond cavil that the x-ray must in the future be recognized in the treatment of epithelioma, and the editor of this department believes that there is no other method of treating these conditions that will show such a uniform result and remain cured for from three to six years after. This report of 111 cases shows a record of 72 per cent., absolutely success-

ful cases, and 19 other cases—in which great benefit was secured; but from some cause or complication cannot be put with those absolutely cured. This report of Pusey's is a superb showing for the x-ray.

Tuberculosis of the Upper Air Passages. Gleitsman, N. Y. Med. Journal, July 4, 1908.

In this interesting paper the writer, in summing up the various methods of treatment, gives a report sent him by Dr. Beck of Chicago on the X-ray and Radium in the Treatment of Nasal Tuberculosis. This paper is full of facts but here will only be considered the part played by the x-ray.

Case 1. "A woman, thirty-seven years of age, suffering from tuberculosis of the nasal septum and secondary tuberculosis of the nose, was treated with the Roentgen rays and later with radium. She was entirely cured, and according to the latest information was perfectly well eighteen months later."

Case 2. "A woman, thirty-six years of age, was suffering with extensive tuberculosis of the nose. She had used during five years all suggested remedies without any result. During seven weeks she received applications of radium alternating with the x-rays. During the winter she went to Florida to recuperate and returned entirely cured. No recurrence six months later."

Case 3. "A boy fourteen years of age, had been treated two years by 'Christian science'; a sequestrum had formed in the back part of his nose, and he suffered also from enlarged cervical glands. The sequestrum was removed, and for six weeks he was treated with radium of 1,000,000 radio-activity. He was entirely well six months later." All three of these cases had the diagnosis confirmed microscopically. He states further; that "Ray therapeutics has a wide field in lupus, and that the Finsen methods gives especially good results in lupus of the nose." "Interesting is the observation of Hull," who explains the action of the x-rays upon lupus by the development of opsonins, through which action the microorganisms become an easier prey to the phagocytes. He came to this conclusion from the successful raying of a lupus after a careful treatment with tuberculin, which stimulated the formation of opsonins, while before its use the lupus did not react to the rays."

This last quotation from Hull is supporting and further substantiates the theories of the editor of this department advanced two years at the Philadelphia meeting of the American Electro-therapeutic Association, in regard to the Action of the X-ray in Tuberculosis.

J. D. G.

MECHANICAL VIBRATION-THERAPY.

EDITED BY FREDERICK H. MORSE, M. D.

Mechanical Vibration in the Treatment of Constipation and Pelvic Conditions. By Mary L. H. Arnold Snow, M.D., New York, New York Medical Record, August 8, 1908.

The writer calls attention to the fact that *Mechanical Vibration* is often a great aid in diagnosis, eliciting facts that are not revealed by percussion or other methods of investigation, especially true of conditions of the liver which is frequently found to be hypersensitive.

"For many years," the writer observes, "the treatment of constipation has been chiefly by drugs which are certain to bring about conditions demanding some stimulant to induce an action, whereas physical measures, particularly the static wave current and mechanical vibration, tone up the nervous muscular and secretory functions, and in connection with the regulation of the liver and digestive functions, soon effect a cure.

"Vibration in this connection produces mechanical, chemical, physical, metabolic and reflex effects. The effects depend very much upon the method of treatment, and general technique. The principles of employment which govern its application are:

"1. The vibration should possess the necessary rapidity and length of stroke demanded to meet a given condition, and exerted pressure must be such as to be painless.

"2. The rapidity, stroke, pressure, or non-pressure should be governed by the indications and the patient's reactionary resistance.

"3. The interruptions when using interrupted vibration, should be limited in number to avoid exhaustion of nerve power.

"4. The intervals of rest should be three, or even four, times as long as the period of impulse contact to assist in perpetuity and fixedness of the effect.

"5. The periods of contact and rest should be rhythmical in the administration of interrupted vibration.

"6. Vibratory effects should be applied to aid or promote functional activity of a part without altering the integrity or unfavorably affecting the normal activity of the part."

"Mechanical vibration in conjunction with dietary measures, and in some instances exercises directed to the compression of the bowels and liver, is the treatment *par excellence* for constipation. When properly administered it is absolutely painless, harmless and productive of the most gratifying results. The quantity, kind, and quality of the food ingested must be

regulated, in order that the functions may not be overtaxed, and that the food may at the same time be nutritious and not too concentrated.

"For infants, who are uniformly cured by the use of mechanical vibration, the mother's milk, or the artificial food, which may contain too much fat, should be rectified. Some children are also apt to consume too much starchy food, or live on a too exclusive diet. With children as with adults, the treatments should be spinal and abdominal.

"The diet used in general, bulk and nutrition considered, should include the following. Stewed fruits, fresh fruits except bananas and pineapples, rye or coarse bread with much butter, or shreaded wheat biscuit, or Graham bread, cracked wheat or oatmeal thoroughly cooked, broiled chops or soft-boiled eggs, roasted or broiled beef, lamb, or mutton, or baked or broiled fish, or roasted chicken; spinach, celery, lettuce, beets, fresh string beans, and a baked potato—sweet or Irish. Hot water is to be preferred to tea, coffee or milk. Six or eight glasses of water should be taken daily.

"A fixed habit of going to stool is in all cases of the utmost importance. In cases of adhesions or spasmodic strictures they may be benefited or cured by local vibratory treatment. If an enlarged or retroverted uterus obstructs the passage the constipation can be cured in the majority of cases by using the static wave current with a metal electrode per rectum, in connection with rectal and body vibratory treatment for constipation.

The following technique is employed by the writer of the paper in the treatment of these cases. "(1) The bladder should be emptied before treatment. (2) If the skin is moist and sticky, dust the surface with a suitable dusting powder. (3) If the abdomen is hypersensitive the application of dry heat by means of a high power incandescent lamp or otherwise will lessen the sensitiveness.

"In vibrating the spinal nerve roots, use a hard rubber ball vibratode and employ a medium stroke and moderate pressure, which should be so graduated as to avoid unpleasant effects. Employ the vibratode between the transverse processes on each side of the spine alternately, from above downward, two or three times. Tolerance to pressure over tender spots increases during an administration and during the course of treatment. The pressure, light at first, should be gradually increased. Prolonged pressure inhibits, and is consequently applied over the hypersensitive places. If the whole trouble is in the lower bowel, the lower portion of the spine alone may be vibrated; but in the majority of cases of constipation the liver is at fault, and the patient may have suffered so long that the health has become generally impaired, in which case we

vibrate the spaces corresponding with all the spinal nerves to restore tone. Contraindications for the employment of mechanical vibration are the presence of cancer or ulcer in the region, and a tendency to hemorrhage.

"The liver is vibrated as follows: Posteriorly vibratory friction or percussion is applied from the spine outward following the line in the spaces between the ribs, using a rubber-padded disc vibratode over the organ, and interrupted vibration with moderate pressure and medium stroke is applied over the liver anteriorly, covering the surface about three times. The vasoconstrictors of the portal system are from the third to the twelfth dorsal nerves, inclusive, particularly the fifth, sixth, seventh, and eighth. Contraction of the gall-bladder may be induced by vibratory stimulation of the ninth and tenth dorsal. The solar plexus and lumbar ganglia may be affected by interrupted vibration. Stimulation of the vagus contracts the stomach and pylorus and induces gastric flow.

"Vibration of the abdomen is accomplished with a padded rubber disc vibratode, using a medium stroke. Two methods are employed: The first is to follow from the cecum to the sigmoid. The second is the one preferred, and used by the writer because it is almost always necessary to stimulate the lower part of the bowel first. Begin over the middle segment of the descending colon, use vibratory friction with firm pressure downward and inward six or seven times, gradually approaching the ribs, but each time ending at the sigmoid. Then vibrate the transverse colon, beginning at its middle segment and proceeding from right to left, gradually lengthening the line of advance as the hepatic flexure is approached; then begin midway between the hepatic flexure and the cecum, and vibrate upward, gradually approaching the cecum until the friction is from the cecum to the hepatic flexure. A ball vibratode or the cap shield of some machines is then used from the cecum to the sigmoid to administer an analogue of the cannon-ball massage. The speed and rate of vibration should be slow, because parts containing unstriated fibers, after being stimulated, react 'for a long time after the stimulus is withdrawn.'

"In many of the cases the additional use of internal vibratory treatment is necessary. A soft rubber vibratode, well lubricated, which may be introduced while in motion, is to be preferred. The administration should be for five minutes, using a short stroke and a rate of speed, which will give the maximum width of the loops that are to be formed by the vibration of the vibratode when the operator watches the vibrator before inserting it, as he varies the speed until the desired rate is obtained. These rectal treatments should be given daily until the bowels move naturally. After they have

moved for several days successively the rectal treatment should be discontinued or given only occasionally as indicated. In obstinate cases, as from a spasmodic stricture, high up, a flexible rubber vibratode 12 or 15 inches long is of service, and is most easily introduced with the patient in the knee-chest position. The duration of the treatment should be from three to five minutes, speed and stroke being as before stated. The rectal tube should be used cautiously if adhesions exist from a former peritonitis. The majority of cases are practically cured in about two weeks by this method of treatment. . . .

"In severe cases of constipation enemas of from one to three quarts of water, according to the indications of the case, are administered, for which the following method of vibratory flushing has been introduced by the writer. A long hollow flexible rubber vibratode having a hole in the distal end, and a metal tube at the side of the top of its fitting at the proximal end, to which a tube from a douche bag is attached, is connected to the vibrator. Water is allowed to flow through the tube before it is introduced. Having been smeared with vaseline, it is gradually inserted, vibrating at a slow rate of speed, the patient being in a knee-chest position. When the tube has been inserted a few inches after first allowing the tube to fill to exclude the air, the water is allowed to flow. The water will be thrown from the opening as from a sprinkler. Gradually increase the speed. After the first pint of water has flowed, gradually lessen the speed and stop the vibrations. Let two or three quarts flow into the bowel, and while the last pint is passing, start the vibrations again, and continue them until the tube is withdrawn. Usually one week of vibratory flushing, used after the body vibration as above described, initiates the improvement.

"In a few uncomplicated cases of constipation, body vibratory treatment alone is sufficient. This is particularly true during childhood. If the patient has been long constipated and there is reason to believe that the bowel is lined with impacted feces, a vibratory enema of one to two cupfuls of oil is given, as described below under the treatment of colitis. This is followed the next day by vibratory flushing, as described above. It may be found necessary to repeat this if the patient still gives a history of passing scybala. . . .

"In cases of *colitis* associated with constipation, most gratifying results are obtained by administering vibratory treatment in connection with a modified Van Noorden diet. On the first and third day in the treatment of colitis a high enema of oil is given with a long rectal tube previously described for flushing. A little oil is allowed to run through the tube first before introducing it, to prevent colic. Vibration should be mild at first—just sufficient to carry the tube up, except in cases

associated with diarrhea, when it is advisable to discontinue it until all the oil is in the bowel, otherwise mild vibration may be continued during the passage of the oil. Disturbances may occur, in which case hot compresses may be used, but I have not found them necessary. Patients may gradually be weaned from the prescribed diet, but it is advisable for them not to depart too early or too suddenly from the dietary régime. . . .

"Vibration therapy is indicated in the treatment of contracted muscles arising from various causes, and may be used in the treatment of amenorrhea, dysmenorrhea, inflammatory exudates, endometritis, metritis, oöphoritis, rectal prolapse, certain prostatic conditions, and coccygodynia. In cases of atony, passive congestion, and amenorrhea, vibrate the lower portion of the spine in the interspaces, using the ball vibratode and anteriorly apply the abdominal vibration and interruptions over the affected parts. . . ."

Mechanical vibration is contra-indicated in pyosalpinx and pelvic abscess. Vibratory treatment of the vagina is indicated in relaxed walls and vaginismus. Enlarged prostate and prostatitis may be treated by local rectal vibration from three to five minutes, the rectal vibratode having a moderate amount of rigidity. In the treatment of hemorrhoids vibration lessens pelvic congestion and stimulates the return circulation. A prolonged rectal treatment is indicated.

"Mechanical vibration in the treatment of pelvic conditions, alone, or with the use of light, electricity, hydrotherapy, or exercise as an adjunct, when applied with the proper care and technique, is a measure which from the results obtained appeals both to the layman and the profession, simple yet effective, easily applied, and not disagreeable. It is a most useful and valuable agent in the hands of the profession doing the physician's noblest work—the alleviation of human suffering."

STATIC ELECTRICITY.

EDITED BY J. H. BURCH, M. D.

An Improved Treatment of Gonorrheal Arthritis (so-called Gonorrheal Rheumatism). By Dr. Edward C. Titus, New York, New York Medical Record, July 25, 1908.

The writer states that "for some time he has been treating prostatitis and seminal vesiculitis of non-gonorrheal character with the static wave current, in which he has confirmed the investigations of Dr. Snow as to the beneficial effect of this current in these cases. Finding, however, that this treatment was of limited service in inflammatory conditions of gonor-

rheal origin, he determined to modify the modality, by adding a non-corrosive chemical action in the tissues, destructive to the gonococcus, finding that by the use of specially designed vacuum tubes applied to these regions, the cases of gonorrheal rheumatism improved and were rapidly cured." He calls attention to the fact that "the actinic action of the vacuum tube discharge exerts a direct bactericidal effect upon deep-seated gonococci. Besides the actinic effect there are generated on the surface of the vacuum electrode, when in contact with the parts or tissues of the body, nascent nitrous acid and ozone, as a result of the disassociation of the air between the surface of the tube and the lining membrane of the part or cavity; these, together with the actinic discharge of the vacuum tube, are carried into the tissues to a depth of from 2 to 6 mm. by the action of the high potential currents."

His success with the treatment of gonorrheal prostatitis together with the researches of the Harvard and Johns Hopkins Universities and the results obtained by Fuller with the curettive treatment of the vesicles, completely curing gonorrheal arthritis led the writer to employ these measures for the treatment of gonorrheal arthritis. His plan of treatment is substantially as follows:—"After the rectum has been emptied, the patient is placed in the Sims position, upon an insulated platform. . . . The vacuum tube, after being lubricated, is then passed into the rectum and up against the prostate gland or seminal vesicles. The instrument is held in position by an ordinary tube holder and stand, or the patient can hold it.

"Connection is then made from the tube holder to the negative side of the static machine. It is essential to begin with a small spark-gap and gradually increase the size according to the effect produced and the tolerance of the patient. A feeling of relief follows each application. Each treatment should last about twenty minutes, be repeated daily for two weeks, and then on alternate days until the secretions from the prostate and seminal vesicles are free from gonococci, which can be determined by 'stripping' the glands, and examining the discharge under the microscope.

"When repeated examinations show that the secretions no longer contain gonococci, and both gland and vesicles are reduced to their normal size, attention can be directed to the joint and other tissue changes by daily application to the affected parts of indirect static sparks."

Static Electricity in Inflammatory Conditions.

Dr. Charles F. Spangler, of Kane, Pa., presents the following cases:

The Direct Vacuum Tube Current in Myalgia of the Shoulder.

This current is administered with the electrode connected with the negative prime conductor of the static machine, the positive grounded, and the patient insulated. The spark-gap is then lengthened to the extent of tolerance and gradually increased after the first five minutes, as the patient will permit. The electrode may be applied over the clothing, but the effect is not so satisfactory as when applied to the surface proper.

The upper dorsal and cervical spinal nerves on affected side are treated for five minutes and the painful areas for twenty minutes, and the applications were made daily.

The reasonably prompt reestablishment of normal local metabolism is affected by the induction of local vibratory muscular contraction, the warmth or friction of the multiple spark and the actinic influence of this modality.

Thirty acute cases under observation were of from twelve hours to six days' duration before beginning treatment. Fifty per cent. of the number yielded to the first, second or third application. The remainder required the fourth, fifth or sixth treatment. Relief of symptoms ranging from eight to twenty-four hours usually followed the first treatment. Three sub-acute or chronic cases were treated during the same period.

Case I, Mrs. A., æt. fifty-six, nurse. The deltoid and biceps of the right side were chiefly affected, and she had been incapacitated for six weeks. She was given daily applications the first week, and on alternating days the second week, when she resumed duty.

Case II, Mrs. K., gentlewoman, æt. thirty, had suffered pain in the muscles of the right shoulder and biceps more or less continuously for three months. Eight applications were made extending over a period of two weeks. Report six weeks after—no return of pain.

Case III, T. C., glass blower, æt. forty-five, had pain in the muscles of the left shoulder for eight weeks. Ten applications were administered within two weeks and established a normal condition.

SERUM-THERAPY.

Serum Treatment of Epidemic Cerebro-Spinal Meningitis.

Charles H. Dunn (Jour. A.M.A., July 4, 1908) gives results in a series of forty cases treated with Flexner serum by intra-spinal injection.

The mortality was 22.5 per cent., complete recovery occurred in 72.5 per cent., sequelæ in 5 per cent.

The effect of the serum was a fall in temperature, improvement in the general condition, relief of the symptom of irritation, and a shortening of the disease.

In cases in which the injection was given late, or in those cases with hydrocephalus, the effect was slight.

In cases in which serum was given in the first week, the mortality was 8 per cent., in the second week, 10 per cent., after the second week, 77 per cent.

The doses were repeated as symptoms indicated. The average dose was 30 c. c.

Serum in Scarlet Fever.

H. Cumpston in the British Medical Journal for May 30, 1908, gives his experience with serum in forty-two cases. The serum used was prepared from streptococci obtained from scarlatinal cases.

He divides his cases into: "toxic" with sudden onset, rapid rise of temperature to 104° or 105°F., severe constitutional symptoms, but little or no swelling of the fauces or cervical glands; and "septic," with a more gradual onset, lower temperature, purulent rhinorrhea, marked swelling of the cervical glands and fauces. The serum seems to be of value in the septic type only.

The dose should be large—50 c. c. and given early in the disease,—as soon as enlarged glands, rhinorrhea, and other evidences of septic infection appear.

The efficiency of the treatment manifests itself,—in the cases that recover (the death rate, percentage of death in cases in which it was used, was 33) by "cessation of delirium, fall in the temperature, disappearance of the muco-purulent pharyngeal secretion with subsidence of the faucial swelling, cessation of rhinorrhea or, in those cases in which rhinorrhea persisted, disappearance of the purulent character of the discharge, and comparatively rapid cleaning and healing of the fauces."

Clinical Observations on Anti-Gonococcic Serum. A. A. Uhle and W. H. Mackinney, Jour. A.M.A., July 11, 1908.

The authors employed a serum prepared according to the direction of Dr. Torrey. The dose was limited to 2 c. c., injected into the buttocks, the intervals varying from one to three days. Their results are as follows:

In cases of epididymitis improvement was observed in about half, but as the patients were confined to bed with elevation of the scrotum they do not attribute necessarily beneficial effects to the serum.

The cases of chronic prostatitis showed no improvement.

Those cases with gonorrheal arthritis were very promptly relieved.

General urticarial eruptions followed the injections in some of the cases.

THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

(Continued from page 422.)

CHAPTER V. (Continued.)

PHYSIOLOGICAL EFFECTS OF RADIANT LIGHT AND HEAT.

In the consideration of the indications for radiant energy in therapeutics, a rational basis for its employment calls in each class of conditions, for a consideration of the relation of the physical properties of the agents to their physiological effects upon the tissues.

The forms of radiant energy penetrate the tissues to varying depths producing direct physical effects, vibratory in character, and secondary chemical, nutritional and reflex nervous influences upon metabolism and the nervous mechanism. When radiant energy impinges upon the tissues without passing through, heat is evolved in the tissues so influenced, in contrast to the Roentgen ray, which passes through the tissues as light passes through the window pane, without the evolution of heat.

When heat is evolved at the periphery from the impinging of radiant light and heat radiations, the effect is not only local but general. A glow of warmth is transmitted throughout the body by the heated blood stream, which also, when long continued or extreme, awakens the activity of the excretory channels through the sweat glands, and maintains the body temperature at normal, through the cooling influence of the absorption by the latent heat of evaporation, thereby setting up a complex influence upon metabolism, far-reaching in its influences, especially so, when these processes so essential to healthy existence are dormant.

It is not heat alone that influences metabolism, but the penetrating luminous rays, undoubtedly, act directly upon the blood cells in the circulating streams, and this influence becomes

marked as the irradiated tissues become hyperemic under prolonged exposures, and in a short period of time the blood of the whole body has been exposed to the oxidizing and sterilizing influences of light. No prolonged local administration of radiant light and heat can therefore be considered local, only; for the effect is coincidently general and beneficial in all conditions of impaired or perverted nutrition and poor metabolism.

The local influences of radiant light and heat from the usual sources are undoubtedly due most to the heat effects, very similar effects being induced by convective heat as shown in another chapter.

The hyperemia induced with the vasodilatation is undoubtedly the effect which exerts the greatest local influence upon the two types of inflammation; in the simple type relaxing the tissues, relieving tissue tension and pain; while in infectious inflammation vascularization with relaxation and softening permits a greater supply of fresh arterial blood to invade the infected area carrying Nature's scavengers, the phagocytes, under favorable influence of oxidation where their presence is demanded. Where infection is present there is the additional advantage from these radiations derived from the destructive or, at least, inhibitive action of radiant light and heat upon the germs walled in in the field of infection.

Clinical experience, in this connection, justifies the assumption that radiant and convective heat and radiant light, to which the higher, less penetrating frequencies are not essential, increase most favorably local phagocytosis and coincidently render the germs inert; a combination of circumstances always effective when employed with energy in the first days of superficial infectious processes, and advancing recovery at any stage.

It has to all intents been demonstrated by Neils Finsen that when the tissues are rendered anemic during exposure to ultra-violet radiations, their action is destructive superficially of germ life. It was the object of Finsen and his contemporaries, however, to carry the exposure to the extent of reaction; in other words, to the extent of profound hyperemia which, in the light of effects produced in the treatment of infection under conditions of hyperemia, would indicate an important part as played by such tissue engorgement. On the other hand, the best results were obtained when the tissues

were rendered anemic during treatment, manifestly due to the antigermicial action of the ultra-violet radiations. The final result is undoubtedly due to a combination of the two effects, germicidal and the induction of the increased local phagocytosis of hyperemia.

It will be observed, therefore, in the treatment of all local or constitutional conditions by radiant light and heat radiations, that the effects are due to the same physiological effects, which will be summarized as follows:

I. The effects upon metabolism, local and general, are due to (1) the induction of increased local activity of elimination and tissue building; (2) diffusion of heat throughout the body by the channels of circulation; (3) by the increased general perspiration induced by general diffusion of heat, when exposures are extensive and prolonged; (4) increased oxidation from heat induced, and the local action of radiant light upon the blood in the dilated capillaries; (5) reflex effects upon remote spinal centers due to peripheral stimulation of the end neurons by heat and light radiations.

II. The effects upon simple inflammation, unaccompanied by infection, is (1) to induce general tissue relaxations with relief of pressure and pain; (2) by increasing local metabolism and elimination to relieve the tissues of the irritating products of defective metabolism as present in conditions associated with myalgias, infectious arthritis, eczema, and similar conditions; and (3) in conditions of mild traumatic injury, treated promptly after injury, to remove early stasis and cure the condition, but ineffective after stasis with induration is established.

III. In acute and subacute infectious conditions alone, or in connection with other measures which inhibit germ processes or increase local hyperemia or both, to (1) increase local hyperemia in the region of infection with a relative increase of leucocytes—the phagocytes; (2) to inhibit the activity of the germs through the intensity of the radiant light and heat radiations, and (3) to stimulate the elimination of toxic materials, local and diffused, by the induction of perspiration and increase of tissue oxidation.

By these means local phagocytosis is stimulated, the germs inhibited and devoured and the toxic material eliminated.

IV. Derivative effects are induced when extensive exposures

are made, rendering the surface hyperemic by prolonged applications of high candle power incandescent lamps over front, back, and sides, or by the arc or incandescent light bath and with the coincident profuse perspiration induced; (1) to lessen the quantity of blood in congested regions and the larger arteries and veins; (2) to lower arterial tension; (3) to relieve an overworked heart; and (4) to coincidentally promote extensive elimination of the locked up products of poor metabolism.

CHAPTER VI.

PRACTICAL METHODS OF APPLICATION OF RADIANT LIGHT AND HEAT.

Success or failure in the employment of radiant energy, depends upon the attention to proper technic as to method, frequency, and duration of treatment. To succeed with any physical agent in therapeutics depends invariably upon the principles of treatment employed, comparisons of results depending as much upon the *men employing them* and the *methods employed* as upon the *diagnosis* of the condition. No physician who will not pay strict attention to the requirements of every case, with intelligent recognition of the requirements of each case, can expect to succeed with the application of radiant energy, or any other physical or other agent. Success here as in most things will depend upon the judgment as to choice of modality, and the knowledge and conscience of the physician in charge. No negligent nor heedless person can obtain creditable results from physical measures. The self-indulgent physician may succeed in some cases with placebos and suggestion, but in the cases that can be cured by physical agents only, an anatomical knowledge and the mechanical sense of the surgeon, together with a willingness to devote the requisite time, technique, and energy to every case, are prerequisites.

Local administrations of light should be employed with the primary idea of inducing local hyperemia, the degree, extent, and frequency of application to depend upon the requirements of the condition under treatment; acute inflammatory affections demanding frequent energetic localized applications, par-

ticularly in infectious cases—two to four treatments daily being essential, as in acute otitis media.

For the local employment with a view to relieving *local inflammation* the effects of the radiations from the incandescent lamps are generally to be preferred to the electric arc; (1) because the intense very superficial hyperemia induced by the higher frequencies of the arc light which are filtered out by the glass of the incandescent bulb, induce tanning, interfering with the efficiency of subsequent applications, and, (2) because the risk of injury to the superficies from the higher frequencies, does not permit of prolonged application of the penetrating luminous rays and infra-red or heat radiations, from which the greater benefit is derived.

The hyperemia of the ultra-violet radiations is superficial and intensely irritating, while the hyperemia of the other frequencies is diffused and not irritating, with an added greater and unquestioned beneficial effect upon local and general metabolism.

The choice of lamps as to candle power will depend upon the extent of the local lesion and the indication for general as well as local treatment.

To circumscribed areas, as about the head and face, or furuncles or carbuncles, the small lamps with parabolic reflector (see Figs. 11 and 12) answer every purpose. When, however, larger areas are to be treated, or when general as well as local treatment is indicated, lamps of high candle power, preferably those which do not focus all of the rays, are to be employed.

For general or constitutional treatment, the lamps of high candle power which project practically parallel rays or rays crossing in various directions are only to be considered, for otherwise either time or thoroughness are compromised, or both.

The method of local administration in all cases as stated elsewhere is best effected with the suspended or swinging lamp, which can be brought close to the bared surface of the body and moved rapidly to and fro, until the surface is actively hyperemic. During the application the disengaged hand of the operator or the hands of the patient may be moved occasionally, in close contact, over the surface, thereby pro-

ducing a remarkable cooling effect to the surface, and permitting more intense administrations.

The hand of the operator who constantly employs high candle power lamps, which is passed over the body of the patient, should be covered with a glove or towel.

The duration of the application for either local or general treatment should be continued for some time after the first flush of hyperemia appears. In general treatment of the trunk this is important, because a necessary degree of influence is not induced upon the circulating blood until a fair measure of hyperemia is present. In local inflammation of either type it is important to carry the induction of local hyperemia to a greater degree of intensity than for general or constitutional effects.

Dermatitis or blistering is rarely effected by the radiant light and heat radiations from the incandescent light or from the incandescent light or the arc radiations passed through glass screens. When they do occur, however, as they may occur in very susceptible individuals (cases which are rare), the effect is transitory and should be treated as an ordinary burn; whereas, for the treatment of Roentgen ray dermatitis, no agency is so generally efficient as applications of radiant light and heat—the two conditions arising from opposite causes—one from excess of stimulation and the other from excess of inhibition.

The Local Finsen method for local treatment of lupus and epithelioma, consists of the application of the ultra-violet radiation passed through focusing rock crystal lenses or rays focused by a parabolic reflector and then passed through plane lenses of rock crystal, with the lense or an outer compression lense pressing against the surface of the tissues irradiated, the pressure being employed for the purpose of rendering the tissues anemic.

Adrenalin applied to ulcerated surfaces to which it is impossible to exert pressure, as in the nose, has proved a valuable accessory.

The method of Finsen has been generally superceded, particularly in America, by the more satisfactory employment of the x-ray combined with static and high frequency applications, or the more recent employment of *Effleurage* as instituted by

Rivière of Paris and later reported by Keating Hart under the term *Fulguration*.

General or constitutional treatment, for effects upon metabolism may be administered either with the high power incandescent lamp, the patient reclining or in the light bath.

General Treatment with the high candle power incandescent lamp is administered to the trunk, the application first to one part of the surface and then to another, swinging the lamp back and forth lengthwise over the body until the surface is more or less hyperemic, after which the patient is thoroughly wiped off, dried, and dressed to be vibrated, which should follow, being administered in a systematic manner on the same table, to be followed in a well-regulated institution with an administration of the wave current with a large metal electrode over the abdomen or some other place indicated. Each of these procedures favorably influences general and local metabolism, acting as congeners in impaired constitutional states, and coincidently in trained hands meet local indications as well.

The light bath administered to the patient, seated or lying in the cabinet, is employed for its effects upon general metabolism, and if possessing any advantage over the method described by use of the high c. p. lamps, it is due to the fact that a greater degree of perspiration is induced owing to the accumulation of a high temperature within the cabinet, and that the limbs as well as the trunk are exposed to the radiations. In administering light baths it is usually customary for the head to protrude from the top or one side of the cabinet.

The duration and after treatment will vary with patients and conditions. When profuse elimination is sought, thorough stimulation of the sweat glands is indicated. The exposure should be prolonged to 30 or 40 minutes after which the patient may remain in the cabinet for a longer period or be removed to a couch and rolled in blankets and allowed to perspire for half an hour longer, after which he may be given a tepid shower bath gradually lowered to 60° F., and followed by a rub and mechanical vibration (general), and a static wave current treatment during rest. Instead of the shower an alcohol rub, vibration and static may be administered.

The treatment by vibration when scientifically administered

is for many reasons superior to manual massage; followed by the static treatment, for which the electrode should be localized according to indications, which is beneficial in all cases and should replace the period devoted to rest, exhilarating as it does the patient with its tonic influence.

With feeble patients or atonic conditions, the time devoted to the bath should not be prolonged beyond twenty minutes, and always followed when possible by vibration and static or auto-condensation treatment. When the static is not at hand, and the auto-condensation high frequency current can be administered, it is indicated except in failing heart conditions and parenchymatous nephritis, in which high tension which is compensatory would be lowered by auto-condensation.

In conditions of plethora or otherwise abnormally high tension, associated with auto-intoxication, auto-condensation should constitute a routine part of the treatment.

Light baths or local high c.p. incandescent light treatments may be administered daily or on alternate days according to indications.

During administrations the pulse and temperature should be watched and treatment should be discontinued when temperature reaches $100\frac{1}{2}^{\circ}$ F., or the pulse becomes weak, rapid or irregular. Water may be given *ad libitum* throughout and after treatment, except in conditions of edema, where it is desirable to induce absorption of the serous effusion.

CHAPTER VII.

TREATMENT OF SIMPLE INFLAMMATION.

A classification of inflammatory conditions not characterized by the presence of some germ, either as a causative or consequent element, is often difficult. Conditions, however, arising from trauma or other accidents, as thrombosis or embolism, or as a result of faulty metabolism, or chemical or climatic causes, may be properly included in that category. So also may be considered some post-operative surgical conditions.

To consider the therapeutics of various conditions from the point of view of employment of one modality, as of light, would be misleading; it will therefore be considered proper to

incidentally refer to other measures when treating of the applications of light to special conditions.

Conditions arising from defective or perverted metabolism as the myalgias, inactive secretions, and secondarily of arteriosclerosis, and perverted conditions associated with a vicious circle as with the reflex or functional neurosis; are remarkably benefited by either local or general administrations of light.

The myalgias arise undoubtedly from conditions of defective metabolism under conditions of exposure to cold, draughts or wetting of the clothing, particularly liable to arise after fatigue in those of inactive pursuits, particularly in the debilitated, and are under the drug régime prone to become chronic, the soreness and stiffness often persisting with exacerbations for years. The affection is confined to no set or group of muscles, but probably most common in the regions of moderate, not of greatest activity, as the back and neck—lumbago and torticollis.

Muscular soreness in the limbs of the active soon disappear from the influence upon metabolism of such activity, and owing to the general activity are least apt to be involved, whereas the dense less active muscles of the back are most apt to be involved—the regions of lesser activity. Lumbago and torticollis are the most common of the myalgias.

Lumbago, the type under consideration, should not be confused with a type of lumbar arthritis arising from sprain or traumatic injury of the spine.

While in acute myalgias radiant light and heat energetically applied are remarkably efficacious, in the chronic or more severe forms they do not compare with twenty-minute applications of the static wave current with an energy just short of inducing muscular contraction, followed by a few well-directed static sparks. Everyone who has become familiar with the use of static electricity has had success from the employment of the static methods. When used in association with static applications, as in other inflammatory conditions, the light should always precede the static treatment for reasons elsewhere given.

Various writers have reported results from the employment of light in lumbago.

Delvers reports a case of *lumbago* of two weeks' standing

cured by the daily treatment of fifteen minutes each with a high c.p. incandescent lamp.

Russels of Chicago reports a case in a patient sixty years of age, of ten years' standing, as cured by sixteen fifteen-minute treatments. The treatments were given daily for six days and afterwards twice weekly. The radiant light and heat was administered with a high c. p. incandescent lamp, held as close as it could be borne. Four months later there has been no relapse. This patient also observed that without other treatment his bowels, which had been constipated, became regular after the sixth treatment.

CHAPTER VIII.

TREATMENT OF INFECTIOUS CONDITIONS.

Specialized employment of radiant energy offers a means in therapeutics especially valuable in the treatment of infectious processes,—tubercular, gonorrheal, streptococcic, or staphylococcic; in fact, in all germ processes in which a local activity of the phagocytes is capable of destroying germ process. The possibilities of success or number or frequency of exposures will vary with the required opsonic index of the individual under treatment. An important principle in the treatment by hyperemia resides in the internal resistance of the subject or patient—the capacity of the leucocyte to seize upon more or less of the germs in the field of infection. It is an important question whether a greater number of leucocytes caused to enter the field of infection, while each consuming a smaller number of germs, may not accomplish the same ultimate result as a smaller number of leucocytes under a higher index, or whether under the employment of agents which inhibit the activity of the germs, as the x-ray, or the other agents, as light and high frequency currents, which increase hyperemia, do not coincidentally inhibit or lower the activity or resistance of the germs whereby the destruction of the germs is facilitated under any condition.

Clinically the writer has demonstrated the truth of each of these propositions, to the extent that it can be confidently asserted:—That in all infectious conditions susceptible to the leucocytic influence, at the proper stage, and in regions acces-

sible to measures which induce intense local hyperemia, under conditions of positive chemiotaxis, it is possible under favorable conditions to abort such processes by destruction of the cause.

No agent of equal intensity is more powerful in contributing the three most important elements favorable to the induction and favorable effect of local phagocytosis than radiant light and heat; and for such favorable action the ultra violet frequencies are not important; *viz.*, (1) the inhibition of germ life, (2) the induction of local hyperemia, and (3) increased presence of oxygen favoring a positive chemiotaxis. The high frequency current produces a deeper, more intense, and more persistent hyperemia, and an inhibitory influence of different character and capacity, but probably farther reaching under favorable conditions, as when the d'Arsonval current is passed through the tissues between two electrodes, but is deficient in the important heat radiations.

The action and uses of the three forms of radiant energy included, may be summarized as follows:

I. The action of the Roentgen ray upon germ life is inhibitory; probably not directly destructive, but by rendering the microbes inert and checking their propagation, render them an easy prey to the phagocytes. To derive the maximum effect from the x-ray in conjunction with other agents an interval of 12 to 24 hours should intervene, following a massive dose of 10 to 25 minutes according to the volume of radiations. With the ordinary static machine of twelve revolving plates making 400 to 500 revolutions per minute, the exposure for a massive dose should be of 25 minutes duration. Employed in this manner the x-ray adds to the efficiency of the means which induce local hyperemia, in the treatment of infectious conditions.

II. The action of radiant light and heat as previously stated is (1) to induce active hyperemia; (2) to increase local oxidation with the induction of positive chemiotaxis, and (3) to inhibit or exhaust walled-in germ process, while the constant influx of cooled blood into the field through the relaxed walls brings leucocytes fresh for the fray.

III. High frequency currents (1) produce profound local hyperemia; and (2) undoubted actinic and other antiseptic effects adverse to germ life.

The three agents may be considered congeners in all cases, and while each when used alone may succeed in selected cases, their combined use in the treatment of most infected conditions, when skillfully managed, is most effective.

It is impossible to consider the treatment of any class of conditions intelligently with the use of one modality, for though in selected cases it may prove efficient, in others another modality or combination may be required. So in a treatise on radiant energy, or any other subject, when the therapeutics is considered, the indication and use of congeners and antagonists of the agent under consideration must be included.

Otitis media, either the acute or chronic forms are conditions which under the *ancient* régime and even in the hands of many modern otologists have too often been left with the possible paracentesis to the further working of the *vis medicatrix naturæ*.

No greater mistake can be made than to fall into this error, when in the light of known possibilities the condition can *always* be aborted in the early stage and cut short in any stage.

The *indication* is to inhibit the pyogenic bacteria and destroy them by the induction of an intense local hyperemia in the field of infection.

(To be continued.)

BOOK REVIEWS.

THE INTERNATIONAL MEDICAL ANNUAL ; a Year Book of Treatment and Practitioners' Index by Numerous Contributors for 1907. (Twenty-fifth Year. Published by E. B. Treat & Co., 241-243 West Twenty-third Street, New York. Price, \$3.00 net.

To compare the Medical Annual with years preceding, one is forced to recognize a progress in medical thought amounting to revolution. The revelations of pathology and bacteriology have led to fuller recognition of the failure of the *vis medicatrix naturæ*, unaided, to cure disease.

While the work touches in a meager way the subjects included in the rôle of physical therapeutics, the present collaborators are evidently incapable of treating these subjects, which are undoubtedly destined to fill in the gap made by the growing skepticism in drugs and the recognized failure of the *vis medicatrix naturæ*. It will take time for the "wiseacres" to appreciate these measures, because it takes study to know them.

From other points of view the work is generally a fair résumé of the progress marked by the profession during the past year.

THE BLUES. (Nerve Exhaustion) Causes and Cures. By ALBERT ABRAMS, A.M., M.D. (Heidelberg), F.R.M.S., Consulting Physician, Denver National Hospital for Consumptives, the Mount Zion and the French Hospitals, San Francisco; President of the Emanuel Sisterhood Polyclinic; Formerly Professor of Pathology and Director of the Medical Clinic, Cooper Medical College, San Francisco. E. B. Treat and Co., 241-243 West Twenty-third Street, New York.

The popularity of this work speaks for itself, as this is the third edition. The work contains subject-matter of great importance.—Among others the Vasomotor Test in Splanchnic Neurasthenia and a chapter on Intestinal Auto-intoxication. The object of the work is to call attention to a variety of nerve exhaustion which the author designates as Splanchnic Neurasthenia, which "has its origin in" a congestion of the intra-abdominal veins. The chapters cover, The Blues, General Irritants of Neurasthenia, Special Irritants of Neurasthenia, General and Special Symptoms of Neurasthenia, General Treatment of Neurasthenia, Splanchnic Neurasthenia—The Blues, The Symptoms of Splanchnic Neurasthenia and Intestinal Auto-intoxication. The subjects are most ably and thoroughly considered, and the summary at the close of each of the first eight chapters should be appreciated by every reader as, they are concise and aptly written. The chapters are exceedingly well written, the sub-topics occupying a prominent place at the beginning of the paragraph treating of the subject. The busy practitioner can find what he seeks at a glance.

The work is well illustrated, containing thirteen figures. The chapters on the Treatment of Splanchnic Neurasthenia and Intestinal Auto-intoxication are exhaustive. The appendix includes the consideration of pulmonary anemia and insufficient development, the cardio-splanchnic phenomenon, blood-pressure, the stomach and colon in relation to the heart, physical examination of the liver, the liver reflex, condition of the lungs antedating pulmonary tuberculosis and breathing exercises for developing such lungs, the heart reflex, the lung reflex of dilatation and of contraction, sympathetic pains, heredity, the sinusoidal current, massage of the liver, human metabolism, chemical demonstration of the action of the sinusoidal current, testing intra-abdominal tension, percussion of the stomach, and the vasomotor test in splanchnic neurasthenia.

MAN AND HIS POISONS. A practical exposition of the causes, symptoms, and treatment of self poisoning. By ALBERT ABRAMS, A.M., M.D., Heidelberg; F.R.M.S.; Consulting Physician Denver National Hospital for Consumptives, The Mount Zion and French Hospitals, San Francisco; President of the Emanuel Sisterhood Polyclinic; formerly Professor of Pathology and Director of the Medical Clinics of Cooper Medical College, San Francisco. E. B. Treat and Company, 241-243 West Twenty-third Street, New York. Price, \$2.50 net.

This valuable work opens a field with which it behooves every medical man to become familiar. The first chapter treats of

Life, and the succeeding ones of Man and his Poisons, Fatigue, the Trixology of the Emotions and Sleep, Chemistry and Physics of Thought, the Symptoms of Self-poisoning, the Psychology of Living in Relation to the Prevention and Cure of Self-Poisoning, the Treatment of Intestinal Self-poisoning by the Sinusoidal Current, the Mental Dyspeptic and the Influence of the Mind upon the Body and Relief for the Idiopath. The book is well and ably written and the subjects treated in a thoroughly scientific manner. An appendix considers the Vasomotor Factor in Blood Pressure, the Abdomen, in Intra-abdominal Venous Congestion, Chromo-diagnosis, the Tracheal Traction Test, the Liver and Lung Phenomena, the Visceral Reflexes, the Lung Reflex of Contraction, Sphygmography of the Abdominal Aorta, Fletcherism, Quantitative Determination of Indican, the Chemistry of Social Diseases and Sinusoidal Operation. Seventeen illustrations, a bibliography and index complete the work on which the author is to be complimented as a pioneer.

MEATLESS DISHES : A collection of Tested Recipes for various dishes in which meat forms no part, including also useful hints on hygiene and science in the kitchen, care of cooking utensils, etc. Price, ten cents. Published by the Vegetarian Company, 167 Dearborn Street, Chicago.

This little pamphlet contributes its part towards the making up of a diet free from meats which is finding an increasing number of followers daily. It embraces about twenty-eight recipes and menus for a Thanksgiving and Christmas dinner.

UNCOOKED FOODS AND HOW TO USE THEM. A treatise on how to get the highest form of animal energy from food, with recipes for preparation, healthful combinations, and menus. By Mr. and Mrs. EUGENE CHRISTIAN. The Health Culture Company, 151 West Twenty-third Street, New York.

The subject of uncooked foods is one that has received considerable attention of late years, particularly since the production of uncooked breakfast foods. The work is apparently designed for two purposes,—as a guide and to replace the common cookbook. As a guide considering the discussion of foods, in some respects it is correct but in others it falls far short of its object, as it is an unsuccessful invasion of the doctor's realm by a layman. As a substitute for the common cookbook it is welcome. The tables as to food values are of prime importance to a student of foods. The recipes include soups, vegetables, flesh foods, eggs, cereals, sandwiches, nuts, cheese and junkets, salads, fruits, cakes, puddings, pies, jellies, mousses, sauces, whips, creams, and ices. Menus for seven days and for banquets are also given. The authors are to be congratulated on the full index.

The Journal of Advanced Therapeutics

VOL. XXVI.

OCTOBER, 1908.

No. 10.

THE ADVANCEMENT OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.*

BY HERBERT F. PITCHER, M.D.

Ladies and Gentlemen and Fellows:

It is with feelings of pleasure and gratification that I greet you all here to-day, for I know every member present has made a great effort, a great sacrifice to come here; not from curiosity or to seek pleasure, but for an earnest purpose and to keep out of the rut. We come here with the purpose of giving our best thoughts, and taking away with us the best thoughts of others.

I have letters from members who say they receive more help and inspiration from attending the meetings of this Association than from all the other medical societies to which they belong. If members who annually attend these meetings find them so valuable, why then do we not have a larger attendance?

I have realized for a long time, that although this Association is valuable to a few, yet as a national body, as our name implies, we fail in our mission.

We are a therapeutic society, the one missing link in the practice of medicine. All of the other departments are making satisfactory progress, but when a remedy is sought the profession throws up its hands in despair. We could select a dozen drugs from the United States Pharmacopeia, and practice medicine as successfully as with the thousands of official remedies placed within its sacred pages. The world's most prominent and broad-minded physicians are to-day drug nihilists. Dr. Frank Billings says, "Modern Medicine has established the fact that specific medication for disease is very limited. The specific sera, used as antitoxins and bactericides, organo-therapy in a very limited field; quinine in malaria, and mercury and the iodides in syphilis, comprise the list." A ra-

* Presidential address. Read before the eighteenth annual meeting of the American Electro-therapeutic Association in New York, September 19, 1908.

tional use of drugs, in simple form, to stimulate or to maintain the physiologic function of organs embarrassed by unhygienic habits, by an acute infective process, or partially crippled by a morbid anatomic process is the chief reliance of the physician to-day. Do not understand me to say there is no place for drug therapy. It will always occupy a most useful place at the sufferer's bedside. The man who starts in general practice without his pill box will soon discover his need. But the physician of the future will use fewer drugs and more brains, his training will be more complete, his resources greater.

His laboratory is at hand where bacteriological examinations are made to aid or confirm his diagnosis; also microscopical and chemical examinations, the study of the blood corpuscles, the estimation of hemoglobin, the variations in blood pressure. Radiographic films will disclose the presence and location of foreign bodies, the position of fractured and dislocated bones, incipient pulmonary tuberculosis, cardiac enlargement, gall bladder and kidney calculi, and many other pathological conditions; and the incandescent lamp will light up the different cavities and orifices of the body. But with all of this armamentarium let him not neglect that which was the stock in trade of the old-time physician—observation. Only he who has practiced medicine for many years, knows its value.

The present generation should be very thankful that the science of medicine is doing so much to prevent sickness and preserve life.

In place of the drug of which we know little, and the action of which we know less, we have the different electrical currents which are applied directly to the diseased conditions; the Roentgen ray, radium, phototherapy, vibration therapy, hydrotherapy, the artificial hyperemia methods, psychotherapy—of which we hear so much and know so little; the antitoxins and vaccines with the opsonic index, a method which is gaining a firmer foothold as experimental research broadens.

The animal extracts also fill a useful place in many pathological conditions. In looking over the pages of the journal of that great representative body of medical men of America, one is struck with the dearth of remedial measures. Hygiene, preventive medicine, pathological findings, bacteriology, etiology, and diagnosis are all great and essential studies, but the sick

man asks with reason, "What are you going to do for me?" A doctor measured out two portions of medicine, and remarked to the patient, "If No. 1 does not cure you take No. 2." The patient aptly replied, "Why not take No. 2 first?" Sick people want the very best remedy, and if we do not treat them successfully they are going to some other doctor. This brings us to the problem of how to become successful practitioners. The quality of success is not meted out to some few fortunate individuals. "It is within ourselves that we are thus and thus." "Luck" means desire and determination; the will to do and dare, to see the opportunity and grasp it with bulldog tenacity.

The very best that is in a man must go into his work. Ability, skill, and conscientious effort must not be grudgingly expended. Every moment must contain the indulgence of a wish; must be a stepping-stone of an ambition. The best skill and strength invested in the effort will return dividends in an increase of skill and strength for future work. This means success.

The ultimate aim and duty of the true physician is to prevent disease and cure sickness. The great awakening in this country to sanitary measures is already having a beneficial effect. Our profession is the legitimate medium through which sanitation and prevention of disease is disseminated. We are not only physicians, we are teachers and philanthropists. We are the only profession who freely give away our own livelihood. Our incomes may not increase, but our glory as humanitarians will constantly grow brighter.

In spite of our watchful care and teaching, sickness will always be with us. In our fight against disease we are free to choose any method, any remedy known to the world. We who are assembled here, who have delved deeply into the lore of the art and science of medicine, sincerely believe we are studying the best method for relieving the ills which flesh is heir to.

Medical science to be useful must be practical. We are dealing with human beings, every one a little different from the other, consequently we cannot treat any two persons just the same, although they may have a disease which is called by the same name. Thus must we study not only the disease but each particular specimen of the human family.

In becoming electro-theraputists, we do not necessarily

neglect any remedy true and tried. We should keep in mind all useful and practical remedies from the time of Hippocrates; for there is always a time for everything. Success in the practice of medicine lies in close observation and the alertness with which the physician applies the right remedy at the right time.

There is an old belief that nature furnishes a remedy for every ill. In that belief I fully agree, for who would have believed years ago that electrical forces would have accomplished the wonders they are doing to-day? Who could have imagined the miracle of the Roentgen ray, the results of phototherapy, and that mysterious substance known as radium which has upset the theories of the savants of all ages? We think of all of those great discoverers from Franklin, Galvani, and Faraday down to Prof. Roentgen, Niles Finsen, and the Curies, and we wonder upon whose brow is fame next to place a laurel. We are all workers, investigators along lines that may bring to us discoveries which may help to mitigate the sufferings of our fellow-beings. Let us then continue our work with the true scientific spirit. Although we may not become famous ourselves, we may be instrumental in helping to build that monument to our profession, the noblest in the world, the most useful and self-sacrificing, the monument for the alleviation of human suffering than which there is nothing nobler, nothing greater.

Electrotherapy is a progressive science; we are as yet beginners in this great study. We do not expect to reach perfection, we do not expect to accomplish the task of placing before the world a remedy which will cure all ills, but every man is expected to do his duty, to be one of the builders of this noble monument. Therefore, gentlemen, with this high conception of our profession for a standard, let us work with a will and the single purpose of elevating the practice of medicine to the science of medicine.

This Association was established eighteen years ago and as you are all aware, it was the first of its kind in existence. Now there are several societies, not only in this country but in other parts of the civilized world. In 1905 the International Congress of Physio-Therapy was formed; last year it met again in Rome, and the next meeting will be in Paris. In reviewing the transactions of those meetings and noting the distinguished

representatives from all parts of the globe, one gets some idea of the rapid advancement that electrotherapy is making.

In this country we have several societies; one of the latest to be formed, and I may say the most prosperous, is the New England Electro-Therapeutic Society, of which we are justly proud. All of the members of these branch societies should be enrolled under the banner of the Mother Society—The American Electro-Therapeutical Association. Until within a few years the membership of this Association was limited to one hundred and fifty. At the present time we number only about two hundred members. With the splendid opportunity of this Association for scientific research and advancement of electrotherapy, I cannot understand the reason of this stagnation, unless we lack ambition.

With the thousands of good, reliable physicians using physical methods to-day, there is no reason why a large proportion of them should not become useful, active members of this society. "In union there is strength," is as true of this society as of others. We not only can help non-members, but a large membership brings more dignity and power than we possess at the present time. We could then blot out the disgrace of the Electro-chemic quacks, and the advertising X-ray Electro-Therapeutic doctors, "A consummation devoutly to be wished."

The name of this association means more than the mere words imply. It stands for all that is the highest and best in electrotherapy, it stands for progress and scientific advancement, and every member who has the interest of the association at heart will become an enlisting officer and bring in the men who are honestly seeking a rational method of treating disease. Within a few years we should number a thousand members, and still there are more to follow.

Right here I would like to mention a subject which is of the utmost importance; it is a matter which should come up before the association for discussion and be voted upon at once, and that is, the change of this Association to a corporate body. We do not expect to be defendants in a suit for damages, but it is a wise saying, "In times of peace prepare for war," and we should realize that in the event of adverse litigation *every member* of this society would be personally liable for the full determined damages. This risk would be avoided by the simple procedure of forming a corporate body.

In two years we should celebrate our twentieth anniversary, and it is not too early to begin to prepare for the event. We should let the world know that we are alive. I would like to hear the sentiments of the members with regard to that event. And now that I am on the subject of meetings I would like to speak of the matter of a change in the time of our annual meeting. I have discussed the subject with a number of prominent members, and they agree with me fully, that the most fitting and convenient time to hold the meetings is in or about the first week of June. My reasons for the change are that about the time we hold our meeting the weather is generally very hot. We have just returned from vacation and have fairly started business, which is interrupted. Then June is the proper time for medical meetings; we need a short rest and change after our strenuous winter and spring work. And June is usually very healthy, which would enable us better to leave business and would tend to bring a larger attendance. If thought advisable we could meet next June at Atlantic City where the American Medical Association will hold convention, antedating our time of meeting two days in advance of theirs, which would make our last day their first or vice versa. Then those who wished could remain through the A. M. A. meetings. The commercial exhibit is very large at those meetings which would be increased if both conventions were held in the same location, all of which would increase attendance, and would bring us more prominently before the public and the profession. This is a matter I would like to have discussed and voted upon at this meeting.

Since the foregoing part of my address was written I received a letter from a much esteemed member who says, "I am opposed to a large membership. I think we can do better work, and work that will count and carry more weight in a small society than in a large one. Quality instead of quantity should be our aim." If we do not have a quantity to choose from, how are we to obtain our quality? It would be difficult to keep up the high standard of our society if there is a small membership—it would lack dignity. With the tidal wave of physical methods sweeping over the world at the present time the name of the "American Electro-Therapeutic Association" would sound ludicrous; it would be the "tail trying to wag the dog."

I agree fully with my dear friend that we should exercise the utmost care in admitting undesirable men. We want the best, and we can get them. The men who use quackish methods in any way should be debarred. Physicians who take up physical methods from a commercial standpoint should be discouraged. We want the honest, hard-working, conscientious physician who will honor the association by honoring himself.

If we are not to have a larger membership, who is to follow in the footsteps of our lamented Newman and Herdman? Where are we to find another Morton, a Cleaves, Massey, Dickson, White, Morse, Bishop, Snow, Titus, Nunn, Brinkmann, Geysler, Gibson, and many others of illustrious fame? These are members the association is proud of, and their works will live after them. We would find it very difficult to fill their places, but there are a great many honorable, well-qualified physicians in this country using physical methods who would gladly join us if they could be benefited by so doing. I remember when the American Medical Association was a small, struggling society. At that time I was urged to become a member. When I mentioned the subject to the Secretary of our district society he said there was no advantage in belonging to it; didn't amount to anything. Does it amount to anything now with its thousands of active members?

NOTHING SUCCEEDS LIKE SUCCESS.

This is a mutual benefit society. We need a large, progressive membership, and non-members using physical methods need us. If we are to make the association desirable we must make it valuable. The most notable advancement in that direction was made at our last annual meeting, when the resolution was passed to investigate and study the therapeutic actions and indications, and methods of applying physical measures. Committees with a chairman were appointed for each department, notice of which has been printed in our Journal since October. I also sent a circular letter to each chairman and members of committees to prepare reports for their respective departments.

A meeting of the chairmen of committees was held in this building June 13 for conference. There were some desirable reports, and others reported progress, with the promise of preparing a full report for the annual meeting. There was some

diversity of opinion with regard to the manner of making the reports, and some members thought so many committees confusing. But all agreed the resolution a good one, that the physiological actions and therapeutic effects of the different physical measures should be closely studied, and some standard of results determined. With the wide diversity of opinion in the use of the different physical methods employed at the present time, we cannot expect definite results the first year.

Investigation and research in a systematic manner should be carried out by all the members of the association. I would suggest that the consent of members appointed for committees be obtained before the lists of committees are made up. Then if a man does not intend to serve he could so inform his chairman; much valuable time and correspondence could be saved in that way.

I would also suggest that members composing a committee of a department be chosen from a locality where they could be in touch with each other, in order that they could confer at frequent intervals, while a meeting of all the chairmen could be held in New York City sometime before the annual meeting. In this way we could come to some definite conclusions in time. If we are to expect definite results we must use definite means to obtain them, use the most scientific and accurate instruments, keep a record of cases, the diagnosis, pathological findings, the therapeutic methods, technique, and results, with remarks of interest. This means work, but it brings results, and it means progress. There is nothing in the world which gives a greater sense of joy and satisfaction than the consciousness of progress made by your own honest endeavors. Once more I want to impress upon each member the necessity of scientific investigation. Do not work for personal aggrandizement alone but for the advancement of science. Give the association the benefit of your studies. Let every theory, however absurd it may appear at the present time, have the opportunity of vindication. Banish all feelings of avarice, prejudice, and jealousy, and let our Society become a Brotherhood with the motto of "One for all and all for one."

50 Merrimack Street, Haverhill, Mass.

PRACTICAL EXPERIENCE WITH AN ALTERNATING CURRENT RECTIFIER.

BY FRANKLIN PATTERSON, M.D., SIOUX FALLS, S. D.,

Member of the American Medical Association, the Nebraska State Medical Association, etc.

Inasmuch as we have to depend, more or less, upon the statements of manufacturers, as to the relative merit of our apparatus, many of us are liable at times to forget that commercial instinct and business rivalry may influence these statements, even among the most reliable makers of electrical instruments.

The following extracts from a circular, entitled, "The Truth about the Electrolytic Rectifier," purporting to be a reprint from a scientific article, would seem to give truth to my statement, especially in view of my own experience with the rectifier.

"Manufacturers making absurd and misleading claims for their 'rectifiers' either do so willfully or from a woeful ignorance of the true character of the products of their own manufacture.

"No doctor would think of using his *Primary Faradic Current* and calling it the galvanic, and yet such a current, with the vibrator adjusted for 60 or 125 vibrations per second, comes nearer to the true galvanic than does that delivered from the electrolytic or chemical rectifier sold for that purpose. . . . The current from the 'rectifier' will, of course, show polarity effects (but so will the primary faradic current) because the preponderance of current, while it is flowing, is in the one direction."

In this paper it is the intention to relate my experience with the A. C. rectifier made by the McIntosh Company of Chicago. I shall not enter into a technical detailed description of this rectifier, which will no doubt be furnished by the manufacturers to anyone interested, but will deal wholly with the results attained with the 15-volt 60-cycle A. C., which when allowed to flow through the rectifier, delivers, as stated by the makers, a true uni-directional current of about 80 volts.

The following three cases, which I have taken from my

records because of the decided nervous temperament of the patients, will perhaps best show the effect of the rectified A. C. as a therapeutic measure.

Case I. Prostatitis, non-specific, associated with spinal irritation in a man thirty years of age, who had received ten daily applications of 40 to 60 ma. of current with the positive pole over the spinal nerves, for twenty minutes, and also five ten-minute applications of 8 to 12 ma. of the positive to the prostate through the rectum, the current being at first obtained from a battery of fifty cells. On the eleventh day the rectified A. C. was used with 40 to 60 ma. of the positive over the spinal nerves and in the afternoon of the same day 12 ma. positive to the prostate. The symptoms were relieved as on the former occasions, the patient failing to detect the substitution of currents. On the following day the patient was treated over the spine with the current from the battery when the symptoms were relieved as before. The next day the current from a small rotary converter, giving 110 volts, was used and the electrode applied over the spine as before. The patient became restless before the meter registered 30 ma. and complained considerably when 50 ma. was reached, this may have been due to the increased voltage. However, at the end of the treatment the pain and tenderness had disappeared, but the patient said that the current had been pretty strong. In the afternoon the same current was used with 8 ma. positive to the prostate for ten minutes. Considerable pain in the gland followed this treatment, which was relieved with an anodyne suppository. Treatment was continued with the rectified A. C. and the occasional use of the current from the rotary converter, with the usual complaint from the patient when the latter current was substituted. This case made a good recovery in about five weeks.

Case II. Urethral stricture, caliber No. 15 Fr. three inches from the meatus in a man aged twenty-eight. In this case the rectified A. C. was used throughout the treatment. On the first day a No. 17 Fr. Newman urethral electrode passed the stricture in three minutes with 4 ma. of current. On the tenth day a No. 19 Fr. electrode passed in four minutes with 4 ma. of current. The third treatment was given with a No. 21 Fr. electrode and passed in four minutes with 5 ma. of current. The patient received eight treatments in all, the last

one being given with a No. 26 Fr. electrode and 6 ma. of current for four minutes. The patient did not at any time complain of discomfort and on urethroscopic examination five months later the urethra was apparently normal in appearance.

Case III. Hemorrhoids in a man of forty-seven years. Treatment was commenced with my hollow copper electrode,* the chamber of which was loosely filled with absorbent cotton wet in normal salt solution, and the copper bulb covered with one thickness of bandruche skin. With this electrode in the rectum and a pad on the abdomen, the rectified A. C. was slowly turned on until the meter registered 8 ma., the positive pole in the rectum, which was maintained for ten minutes. The patient made little or no complaint during the treatment. Upon drying, the electrode covering plainly showed the characteristic greenish color of the copper salts. The treatment was repeated on the third day with the current from the battery, 8 ma. of positive current to hemorrhoids for ten minutes with the same result. The third treatment was given with the current from the rotary converter, 8 ma. of the positive pole for ten minutes, and while the patient did not complain, he said that that particular treatment had been a little more severe than the previous ones. The seventh day he was given the current from the rectifier 10 ma. of the positive pole for ten minutes. This current was used throughout, twenty treatments in all, the milliamperage used was as high as 16 ma. with the last five treatments. There was a complete disappearance of the hemorrhoidal condition.

* "The Treatment of Hemorrhoids with the Constant Current, and a New Electrode," *ADVANCED THERAPEUTICS*, March, 1907.



CANCER AND ITS TREATMENT BY CATAPHORIC
STERILIZATION.

BY G. BETTON MASSEY, M. D.,

Attending Surgeon, American Oncologic Hospital, Philadelphia.

(Continued from page 455.)

AFTER OBSERVATION.

One of the most imperative duties of the surgeon is that of repeated inspection of a patient after an operation for the destruction of a cancer to ascertain if the work has been complete and thorough. With the possibilities of minor cataphoresis at hand to quickly and simply destroy local foci overlooked in the major application before a considerable regrowth has occurred, the importance of after inspection is greatly increased, for it enables us to snatch many a victory from otherwise certain defeat. It is half the battle in this form of war against cancer; and the same may, in fact, be said of any surgical method.

This after inspection may be divided practically into two periods: that between the separation of the slough and the healing of the wound; and that between the healing of the wound and the expiration of three to five years after the healing.

The first period is one of the most valuable features of the cataphoric method. During this time the painless wound is open for the most thorough observation, and an opportunity is given the surgeon to apply his highest skill in the detection of doubtful nodules and prominences. No trained application of both sight and touch could be of more value to the patient, and both of these senses should be developed by the worker in this field to their highest perfection.

Practice only can develop this nice discrimination between a healthy granulation and an unhealthy one, but the important points are that *indurated, rounded granulations should be regarded with suspicion*—a suspicion that should lead to their destruction at once by a minor application. A wound that is mainly healthy will furnish discharges that are entirely free, also, from the characteristic odor of cancer. *Any return*

of a previously present odor should, therefore, dictate additional treatment, either a series of minor applications at once, or a second major application at the earliest opportunity—usually in about four weeks from the first. Finally, the approach of a normal epidermization in the edges is shown by a flattened, soft border of a whitish-blue color, with a tendency to a puckering contraction. A nodular, raised, dark-colored edge, showing no tendency of the wound to contract, indicates the imperative necessity for further treatment.

Any doubt that may exist as to the true nature of such granulations should be decided in favor of intervention; like Cæsar's wife, normal, post-operative granulations should be absolutely above suspicion. To suspect should be to condemn.

Should the doubtful granulations be at some distance from the sensitive edges of the skin or mucous membrane, towards the middle of the excavation, they are readily destroyed by a prompt series, or at times a single, minor application, the insensitive granulations permitting from 50 to 75 milliamperes to be used without pain. If the edges show disease, a major application is imperative, owing to the pain that would be produced by the minor method.

The second period of after observation, extending from the healing of the wound until the expiration of three to five years, is fully as important as the first period, and I fear is greatly neglected by surgeons at present, who would find evidences of recurrence much earlier than common if they were systematically looked for. To obtain full coöperation of the patient he should not be discharged at this time as cured, but merely as *without manifest evidence of disease*, as is the rule at the Oncologic Hospital, being obligated in writing to return for inspection monthly during the first year and quarterly during the second and third years after discharge.

POST-OPERATIVE RADIOTHERAPY AND PHOTOTHERAPY.

Some radiotherapeutists lay stress on the value of post-operative radiation to insure destruction of latent cells in the region of the wound. This would seem to be a most excellent procedure, and there is no doubt of its importance in some cases; but it has the disadvantage in others of producing a dermatitis, while in all cases there is a disturbed nutrition in the wound that may interfere with the detection of slight recur-

rences near the surface that could be instantly destroyed by a minor application if discovered promptly. The conditions of each case must dictate the proper course to pursue, the author having recourse to radiation in a small proportion of cases only for the reason given. If re-treatment by cataphoresis seems inadequate in a given case of recurrence the rays should be begun at once.

Phototherapy, on the other hand, may be employed to assist the healing process in any large denudations, and it has seemed to the author to be valuable to quicken the healing, and to assist in the determination of the question whether the granulations and edges of the wound are healthy or not.

CHAPTER VII.

CONCERNING THE CHOICE OF METHOD IN THE TREATMENT OF MALIGNANT GROWTHS IN VARIOUS SITUATIONS AND STAGES.

There is to-day no more important question in medicine than the proper method of convincing the public, and possibly also many members of the medical profession, of the supreme importance of early and vigorous removal of all accessible cancerous growths in their earliest incipency. This means, with the exception of certain skin cancers, and possibly certain sarcomas, their operative removal. The exceptions relate entirely to those epitheliomas which even in their incipency are best treated by Roentgen rays, and to sarcomas in inaccessible situations. No other treatment now known, including all the recent fads, need be considered for a moment, for none have verified their ability to do more than cause fatal delay in operable cases.

In thus stating the inevitable need of operation in all but the excepted cases, and immediate operation is emphatically meant, the author includes of course the methods described in the preceding pages, for the cataphoric destruction of cancer cannot be regarded in any other light than operative removal of the disease, even though it may not be accompanied by the loss of blood usually associated with operative procedures.

In the vast majority of incipient growths the question is therefore not "Shall this or that be tried before operation?" but "What form of operation is best suited to the individual case?"

To answer such a question to the best advantage requires usually more than the experience of any one operator, for few men are capable of comprehending adequately the work of another greatly differing from their own. This difficulty is one that is, nevertheless, readily met in the manner anciently dictated in the ethical procedures of the medical profession. Consultation is the key to the best results, provided only that experience and judgment be both secured for the conference.

INDICATIONS GOVERNING THE CHOICE BETWEEN CATAPHORESIS
AND OTHER METHODS.

Taking a broad view of the subject, some remarks may therefore be made in this place on the comparative suitability of cataphoresis and other methods in individual cases, after briefly enumerating the general advantages and disadvantages of several methods.

This choice of operative method, it should be understood, is based mainly at present on the situation and stage of the growth rather than its type or variety, though considerations based on the variety dictate important modifications of technique.

Comparative Advantages of Cataphoresis.—As compared with excision by the knife, this method presents the following advantages: The cancer cells or germs are killed *in situ* at once and the surrounding absorbents sealed, preventing the operative re-infection of the cut edges that has been said to accompany the former method when the incisions are perforce close to the edges of the growth; it permits of the destruction of a small growth in certain organs, such as the breast or tongue, without the removal of the whole of the organ; in spite of scepticism natural to those who have not observed the method, it may be depended on to destroy infected glands in the axilla (not too close to the axillary vessels) more thoroughly than incision; it is bloodless, and hence may be employed in highly vascular growths without the weakening effect of loss of blood; and, most important of all, it permits of a strictly localized, bloodless destruction of growths within accessible cavities—such as the nose, mouth, vagina, and rectum—by the use of insulated electrodes, without disturbance of overlying healthy tissues or the extensive operations necessary

particularly in the first two cavities mentioned, and in mouth cases, without the danger of septic pneumonia from insufflation of blood, as often happens during excision.

No comparison is possible with the curette in the treatment of cancer, as this instrument should be looked upon as capable only of aggravating a malignant growth, and should never be used in such cases. A minor cataphoric application is a complete substitute for curettement, accomplishing all that curettement may do, with a total absence of its disadvantages and power of harm.

As compared with the thermocautery and caustic pastes, the cataphoric method is more controllable and may be made to reach the periphery of the growth at once, under anesthesia, and thus painlessly and accurately accomplish in a few minutes what is sought to be done blindly by caustics during weeks of acute suffering. It is employed as easily within cavities as externally. The periphery (which is the vital portion of the growth) is sterilized and sealed in the cataphoric process. Finally, the slough produced is sterilized by added sterilizing ions rather than temporarily by heat, as in the thermocautery, and remains sterile and odorless the greater portion of the time until separation occurs, while the intensely odorous sloughs produced by the thermocautery are well known.

The amelioration, and at times actual cure, already observed in many cases of malignant disease under Roentgen rays, make a comparison of this method with zinc-mercury cataphoresis also most appropriate at this time. The question of selection between the two methods is one largely depending on the variety of the growth, though its situation is of great importance. In cases that present but little difficulty in their immediate eradication by cataphoresis or excision, and in which delay would increase the chances of internal dissemination, the selection of one of the two latter methods is surely the part of wisdom. Should cataphoresis fail to eliminate all of the disease in the first application, and show little sign of success after prompt repetition or repetitions, the rays should be begun at once. But no case that may be easily brought within the powers of the quicker method, particularly no case presenting a liability to metastasis from delay, should be subjected to the uncertainties that yet surround the radiation method. It should be remembered, also, that certain obscure dangers attend re-

peated radiation that are not found in connection with the cataphoric method.

Comparative Disadvantages of Cataphoresis.—As compared with the knife, one disadvantage of this method is the cost of the apparatus and the necessity for the possession of a working knowledge of medical electrophysics by the operator. This needs but to be mentioned to be dismissed, since the cost of both requisites is too slight to be put into the scale with life itself. A real disadvantage in a highly operable breast case, for instance, is the time necessarily spent in the hospital while the slough separates, as compared with the much shorter time required in hospital after excision. Its real indication in breast cases, aside from the eradication of a small carcinoma in a young woman with preservation of the breast, is in the treatment of breast and axillary invasions that are past, or still on, the borderline of knife operability, and in these cases the time required for the wound to close is a distinct advantage, as it permits of an observation that often enables us to secure success in the face of impending failure, by showing the need of additional minor applications.

Minor cataphoric applications can rarely be successfully made to deep-seated growths in the neck. In this situation a major application has distinct dangers, both by interference with the pneumogastric nerve, thus endangering respiration and circulation, and through the possibility of the inclusion of large veins in the destructive process, with the consequent risk of secondary hemorrhage. This subject will be further discussed in the chapter on carcinoma of the neck.

As compared with caustics and the thermocautery, the cataphoric method has no disadvantage whatever.

Compared with x-rays, the cataphoric method has the disadvantage of requiring anesthesia at times, and of always producing a wound at the site of the growth; but this wound is intelligently made, and unlike the possible wounds produced by x-rays, is sterile and heals very easily. It is also hoped that radiotherapy will be found to possess the advantage of favorably affecting sarcomatous growths within the abdomen or chest which are beyond the reach of the cataphoric method. But a most important advantage of x-rays over cataphoresis, in skin cancers that have been found to be amenable to the rays, is the fact that a large surface may be simultaneously

treated by the rays, while the growth may be of such slight depth as to be capable of being treated by cataphoresis in a minor form only, and by many repetitions in small areas. Alternate employment of each method may be of value in such cases. A disadvantage of cataphoresis in the treatment of epitheliomas near the eyelids is the tendency to distortion of the latter in the healing process. When such growths respond to the rays this sequel does not usually follow.

CONCLUSIONS AS TO CHOICE OF METHODS.

A statement of the author's conclusions concerning the selection of the best method among those now known for the treatment of a definite case of cancer would therefore read as follows:

1. The knife, being preferred as the simplest remedy, offers the best or the quickest relief in the following situations: All operable growths still confined to the interior of organs that it is impossible to conserve safely and that are capable of complete removal, such, for instance, as the eyeball; the uterus (when confined to the body, but not the cervical variety); the ovary; the testicle; all strictly internal organs; and the highly malignant sarcomas of the extremities where high amputation is possible (if accompanied by cataphoric sterilization of the infected lymphatic glands above the seat of amputation). A mammary carcinoma without advanced infection of the axillary glands—in other words, a "highly operable" case, in which so much of the gland is affected as to preclude the possibility of saving the greater portion of the breast—should be removed by the knife together with the tissues of the axilla, provided a wide-sweeping operation be done, for this procedure should be as free from chances of recurrence as a thorough cataphoric destruction, and convalescence is shorter.

2. Cataphoresis should be employed in most operable and some inoperable external growths where experience has shown that the prevention of recurrence is difficult after knife operations, or where, as in the face, tissue may be successfully saved and a better cosmetic result secured by this method. In all small incipient growths of the skin it is both more easily applied, more successful, and less abhorrent to the patient; and as it is more likely to be accepted by patients in earlier stages of the growth than the knife, an additional chance of cure

of great importance is presented by it. In mammary carcinoma an early or doubtful cancerous nodule in a young woman may be eradicated by cataphoresis without loss of the breast, and the same may be said of a cystoma of the breast. It is also believed by the author to promise the better result as compared with the knife in advanced, semi-adherent carcinomas of the breast with well-defined masses in the axilla (if the higher axillary glands are not affected). But, far and above any other method, cataphoresis is most suitably applied to malignant growths in the accessible cavities of the body: the nasal cavities, the mouth, vagina, and rectum.

Finally, in so-called inoperable cases in many situations it presents a valuable medium of palliation, though its use for this purpose is likely to prejudice its employment in the true sphere of its greatest usefulness: the destruction of incipient growths.

3. Radiotherapy should be used in extensive skin cancers of low virulence and slight depth, where cataphoresis would be tedious or impracticable: it should be tried in epitheliomas near the eyelids, where cataphoresis or other methods might cause distortion of the lids; it often succeeds where all other methods have failed in surface growths; and it has caused the disappearance of some internal sarcomas.

4. A combination, or serial employment, of two or more of the methods mentioned, as conditions arise, is at times the wisest course to pursue in the treatment of an intractable case, leading possibly to an eradication of a still local cancerous growth that would not have yielded to any one method alone.

CHOICE OF MAJOR OR MINOR CATAPHORIC APPLICATIONS IN A GIVEN CASE.

The question whether a case for which the cataphoric method is selected can be successfully treated by the minor method, or demands a major operation, is one at times difficult of determination, though the general principles of choice are clear. *No highly malignant carcinoma or sarcoma in any situation should be subjected to the risk involved in the delay, and possible aggravation essential to the minor method unless it is so small as to be eradicable in from two to three applications—preferably in one application.* This at once places the majority of carcinomas and sarcomas, in the late stages in

which we at present first see them, in the list of those requiring the major application.

The minor method may, nevertheless, be effective in very extensive growths of low malignancy where the major application is inadvisable because of the feebleness of the patient, or because a thorough application by the major method would be too extensive a wound for subsequent cosmetic reasons; but such cases must be of the kind that have existed for years without the appearance of metastasis or of extension to overlying skin or mucous membrane. Of the more virulent varieties, those of the small size mentioned above, when in insensitive situations, may be effectually destroyed by minor applications, as well as those recurrent nodules found just beneath the skin after amputation of the breast for carcinoma. These nodules are 'no larger than a pea, if diligently searched for during the first weeks after the operation, and represent either unnoted pre-operation tissue colonies, infected lymphatic valves, or direct re-implantations of cells during the cutting operation. Carcinoma of the cervix uteri in its earlier stages is also suitable for what is, in this situation, a minor application, though the insensitive nature of this area permits the stretching of the term "minor" to cover applications without anesthesia of one and two hundred milliamperes for thirty minutes. Rodent cancer of the face is often best treated by the minor method, though when the growth is extensive many applications extending over a long time may be required, the particular advantage of the minor method in this instance being the lessened scar that finally results. The minor method is, of course, applicable to all small growths that are properly classed as but moderately malignant.

Distinctly virulent growths, even of small size, require the major method when situated in sensitive areas such as the lip, breast, anus, etc., though complete sterilization may be effected in a few minutes, as the pain produced by the minor application in these situations precludes its use.

Finally, we must be prepared to promptly apply minor applications to suspicious granulations appearing before the healing of large wounds after the separation of the slough of major applications, as our best results may be thus snatched from impending defeat. The open wound of the cataphoric method becomes from this point of view one of its chief advantages.

(To be continued.)

Editorial.

IS "RHEUMATISM" A MISNOMER?

THE old notion of the uric acid diathesis and the systemic accumulation of the products of poor metabolism as a causative factor of so-called articular rheumatism, is becoming obsolete during recent years in the advanced professional mind. The lay opinion, and, too often, the professional assertion, that this or that inflammatory condition involving a joint is rheumatism, is open to criticism. Far too many physicians without careful investigation are treating for rheumatism, employing the usual remedies, such conditions as neuritis, synovitis, rheumatoid arthritis, and flat-foot. The differential diagnosis of these conditions from infectious arthritis is not difficult. Any physician who fails to differentiate these conditions and submits his patient to large doses of the salicylates, thereby producing an irritation of the gastric mucous membrane without any possibility of benefiting the condition, is incompetent to treat these cases. The fact that infectious arthritis yields to such remedies, may too often lead the medical man to prescribe without further investigation for other joint or muscular inflammations, as though it were "rheumatism," as the neurologist too often prescribes mercurials and iodide of potash for tabes and other cord affections, as though they were only of syphilitic origin. The only excuse that can be found for this carelessness in treatment is in the fact that for such conditions there is a drug remedy; whereas for many other chronic processes under the old régime and even the present, with those who do not know the physical methods there is nothing to be derived from drug medication.

The physician who successfully employs physical therapeutics in the treatment of these inflammatory conditions, cannot fail to be impressed with the shortcomings of his brother practitioners, who only employ surgery and drug medication. For hundreds of cases, which have been treated in this improper manner as rheumatism, fall annually into the hands of physicians who are up-to-date in the physical methods of treatment,

and are more or less promptly cured; thereby casting a reflection upon the judgment of the careless practitioner not only in point of diagnosis, but also affording convincing evidence that the medical profession should be better informed as diagnosticians and therapists. Otherwise they not only bring discredit upon themselves, but upon the profession at large. It is from errors of this sort with failure to appreciate the etiological factor and employ an effective method of treatment, that irregulars and osteopaths thrive. When it is generally appreciated and fully demonstrated as it seems probable to be, that so-called rheumatic conditions are of infectious origin, the term "rheumatism" will be abandoned. Such recognition will lead to a better understanding of the other affections which are so often confused, and not as now mask the true conditions.

Probably no other class of cases are so generally misunderstood as those which are designated "chronic rheumatism," an affection which cannot be definitely described, or designated. Traumatic synovitis, the local forms of neuritis and rheumatoid arthritis, in the vernacular of the unscientific physician and his patients are as a rule designated chronic rheumatism, and dosed with salicylates and never benefited by such treatment. Hordes of such cripples go unrelieved when rational physical treatment would, or would have, in an early stage, cured them. These are a crying reproach to medical practice, and yet how few physicians know, or care to know, how to employ the measures that will relieve them.

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THE NINETEENTH ANNUAL MEETING OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

THE nineteenth annual meeting of the American Electro-Therapeutic Association, just closed, marks an era of progress in its history. Of all meetings in the history of the Association, the scientific sessions of this meeting were marked by a larger number of scientific papers of a high order than those presented at any previous meeting.

A feature of the sessions was the report of the Committees on methods of treatment; each Committee giving a full, scien-

tific régime of the physiological actions and therapeutic indications of the agents or modality under consideration.

The exhibit of electro-therapeutic and other physical apparatus was the most complete and marked by a general excellence in the quality and variety of apparatus presented not previously so complete, indicating a progress of the manufacturer keeping pace with the growing demands of the profession.

The attendance was unusually large, and upwards of twenty-five new members were enrolled during the three days' session.

By the superior management of the Engineers' Building and the courtesies of the attendants, the comforts and convenience of the members and their friends were provided for in a most ample and hospitable manner. To Mr. Lambdon, the Superintendent of the Building, the Association are so grateful that the same place has been already designated by the Council for the ensuing year.

The record of work done at this session marks, it is believed, a progress in advanced therapeutic measures unequaled by any meeting or congress in the history of physical therapeutics.

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THE OFFICERS OF THE AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

AT the recent meeting of the American Electro-Therapeutic Association, the following officers were elected:

For President, Dr. Edward C. Titus; for 1st Vice-President, Dr. Wm. D. McFee; for 2nd Vice-President, Dr. T. D. Crother; for Secretary, Dr. J. W. Travell; for Treasurer, Dr. Richard J. Nunn; for members of the Executive Council for three years, Dr. Herbert F. Pitcher and Dr. Francis B. Bishop.

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ELECTRO-THERAPEUTIC AND X-RAY CONGRESS.

IT is proposed to hold a Medical, Electrical, and X-ray Convention in London, at the Caxton Hall, Westminster, from July 19 to 24, 1909. A number of American, colonial, and foreign visitors are expected, and there will be an exhibition of ap-

paratus in connection with the Convention. It is particularly hoped that medical men in the colonies and in America will take part in the meeting, as this will be the first English-speaking Congress which has been held in Europe. Anyone interested in this subject will kindly communicate with the Editor, who will gladly give any further information."—Archives of the Roentgen Ray for September.

This invitation extended to physicians interested in electrotherapeutics and x-ray treatment will be appreciated by those who may find an opportunity to avail themselves of English hospitality. The dates of the meeting will be generally agreeable to American physicians, for during that season it will afford an opportunity for profitable recreation.

The Editor of this Journal will take pleasure in receiving the names of any who may contemplate attending this Congress that all may attend in a body.

It is hoped that a good representation of American physicians and manufacturers will be present at this meeting.

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IN MEMORIAM.

Whereas, death has removed from our numbers Dr. John D. Holt of Berlin, N. H., an energetic and industrious physician, beloved by all who knew him, be it

Resolved: That we extend our profound sympathies to his wife and family in their bereavement in which the Association participates, and

Resolved: That a copy of this resolution be sent to the family of the deceased, and also published in the Official Organ of the Association, the Journal of the American Medical Association, and the Medical Record.

(Signed) EDWARD C. TITUS, M.D., President.
J. W. TRAVELL, M.D., Secretary.

Progress in Physical Therapeutics.

STATIC ELECTRICITY.

EDITED BY J. H. BURCH, M. D.

Treatment of Exophthalmic Goiter and Myxedema. By William Benham Snow, M.D., New York, Therapeutic Record, May, 1908; Archives of the Roentgen Ray September, 1908.

Dr. Snow carefully reviews the pathology, symptoms, and etiology of Graves' disease and compares the results of surgical intervention with the x-ray.

In the early stages of exophthalmic goiter Dr. Snow advises the application of the static wave current, which he affirms is indicated from the fact that it induces energetic contraction and relaxation of the structures beneath which it is applied. When administered, with a discharge not too rapid at the spark-gap, an active tissue gymnastics is induced throughout the substance of the gland, thereby forcing out all infiltration and removing all inflammatory action and restoring to normal the metabolism.

The current is administered by placing a metallic electrode over the thyroid gland and securing it in place by means of a bandage. This metallic electrode is connected with the positive side of the static machine, the negative side being grounded. The current is measured by opening the spark-gap just long enough to cause the tissues to vibrate energetically, but not sufficiently long to produce a tonic contraction of the sterno-cleido mastoid muscle. The current should be administered twenty minutes daily. By this means alone Dr. Snow has known simple goiters to disappear within a few weeks and the exophthalmic cases also to cease to progress or disappear and the tachycardia to be entirely relieved. In cases which have been under observation that were treated early, there has been absolutely no recurrence of the trouble.

Dr. Snow affirms that if the case is more advanced or does not respond satisfactorily to the wave current, the x-ray is certain to meet the indications if properly used. To achieve the best results Dr. Snow advises that the x-ray treatment should be continued from three to ten months, or even longer. There should be a series of successive exposures, carrying the effect each time to the induction of dermatitis, until the enlargement of the gland is reduced and the hyperactivity permanently abated. The duration of each exposure should be ten minutes with a tube of medium vacuum (about one inch spark resistance) with the anode from eight to ten inches from the region of the thyroid gland on alternate days until dermatitis is produced.

Dr. Snow affirms that should the dermatitis show signs of advancing beyond the first stage, that it can in every instance be aborted by the daily application of the high power incandescent lamp. After the subsidence of the dermatitis the treatment by means of the x-ray is again continued. During the interval caused by the dermatitis, which on an average is about three weeks, the static wave current is used in connection with radiant heat.

Dr. Snow reports an interesting case in which most remarkable results were achieved by means of the above treatment.

In the treatment of myxedema Dr. Snow employs the static wave current as described in the treatment of Graves' disease. The applications are made daily for a period of fifteen minutes, employing a spark-gap of from one to three inches according to the tolerance of the patient. The static wave current should also be applied over the abdominal glands, employing a large metallic electrode of about 6 x 8 inches, and administered with a spark-gap of from five to twelve inches according to the muscular conditions of the patient. The spark-gap should be regulated to the length that will produce profound muscular movement of the abdominal walls, but never so energetic as to induce tonic contraction of the muscles. Following the application of the wave current Dr. Snow advises that the patient should be subjected to a thorough vibro-massage over the edematous skin of every part of the body.

In connection with the above treatment Dr. Snow recommends the administration of two to four grains of thyroid extract three times daily, the dose being regulated to the characteristic symptoms induced, avoiding heart acceleration.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Evolution of the Microscope-Therapeutic Action and Dangers of the Roentgen and Becquerel Rays—Radium, Opsonic Method of Treatment of Dermatological Diseases. By Henry Alfred Robbins, M.D., of Washington, D. C., Journal of Dermatology.

The author gives a history of the microscope with a description of some of its discoveries. He also gives a history of the Roentgen ray, its therapeutic effects and attendant dangers, quoting from several authors; the discovery of Becquerel's rays and radium; also the discovery of the opsonic by Wright and Douglas, all of which I will only abstract as they relate to dermatology. The author goes on to state that the greatest danger from the Roentgen rays lies in their promiscuous employment by those who have not been taught their use or the

knowledge of their physiologic action and therapeutic effects. He thinks the Roentgen ray should be taught medical students by practical laboratory and clinical courses. That their employment on the human subject should be limited to qualified practitioners. Action to this effect has been taken by recognized bodies of medical men in Vienna, in Berlin, and in Paris, by the German Roentgen Society, and by the Academy of Medicine in Paris.

The author enumerates the diseases in which the x-ray has been recommended, which includes most of the diseases of the skin. But he does not state how many are remedied. He quotes Professor Zeisler, who says: "Of acne I have certainly treated hundreds of cases with the rays, but I have long ago abandoned the plan of relying solely upon their action. I use them now in a very gentle manner, while continuing to lay great stress upon general hygienic and dietetic measures, employing also local surgical measures. In this way I can point to satisfactory results. That the rays are no means of preventing relapses there is no doubt. . . . Many cases of my own that at one time I believed cured permanently, have returned within a few months with relapses. All this shows that, after all, one important effect of the rays consists, as Kapasi pointed out years ago, in the paralyzing effect upon the superficial blood-vessels and that as soon as these regain their normal tone, the old condition is apt to return. Another serious drawback is the pronounced atrophy, which is apt to remain after long-continued exposures."

[I think most dermatologists will disagree with Professor Zeisler in the treatment of acne with the Roentgen rays. So much depends upon the technique and proper dosage that it means success or failure. We know that the x-ray exposures will diminish the functional activity of the sebaceous glands. We also know that we do not get much atrophy or the formation of telangiectases unless we cause some dermatitis, which should be avoided in this disease. The proper technique to use is to have a soft tube with enough x-rays to show just a faint green glow in the tube, with exposures of five minutes' duration, from one to three times a week. The walls of the tube should be about six inches from the surface to be treated. Under these conditions the seborrhea disappears, the comedones and acne cease, and as the sebaceous follicles diminish and the pores become small, the texture of the skin improves. The treatment may take several months before a permanent result is accomplished. A minor number of cases may need additional treatment at intervals for a few months. But if in the mean-

time bad habits are corrected, and attention to diet and hygiene are enforced the results are better than from any other method. —H. F. P.]

Dr. Robbins quotes from Arthur Whilfield, M.D., F.R.C.P., paper on the Opsonic Method in Skin Diseases, as follows: "I may state that I believe that the opsonic method foreshadows an enormous advance in our control over infectious disorders, but that at present there exists a great hiatus in our knowledge which renders the results uncertain in some cases. The following conclusions are, however, based on long and steady work at the method and are, I hope, stated with reasonable impartiality:

(1) "The opsonic treatment of boils is uniformly successful, and is the only form of treatment for general furunculosis, which is in the slightest degree reliable.

(2) "In sycosis the treatment is a valuable aid, but must be continued for long periods in proportion to the duration of the disease, and is best combined with x-ray depilation.

(3) "In acne the treatment is uncertain; in some cases being most brilliant, in others without the slightest avail.

(4) "In septic dermatitis and ulcers it is of very distinct value as an auxiliary.

(5) "In Bazin's disease the treatment is somewhat uncertain, but is sometimes of assistance. In tubercular ulceration it is of great value.

(6) "In lupus the treatment alone is too slow and uncertain to be recommended. I have found it of value combined with the x-ray."

SERUM-THERAPY.

EDITED BY I. OGDEN WOODRUFF.

Thyroid Extract in Epilepsy and Migraine Apropos of Ten Cases.

Alfred Gordon in the Pennsylvania Medical Journal gives his experience in the use of this drug in a selected series of cases.

"There is," he says, "a series of cases, which are, so to speak, thyroid in nature and in which the administration of the extract of this ductless gland gives satisfactory results. The therapeutic test, therefore, is at the same time pathologic."

He reports very satisfactory results in cases which had previously resisted dietary regulation, bromides, and dechloridization. A citation of cases follows.

Note on Deutschmann's Serum Against Infectious Diseases.

Eugene Caravia in the N. Y. Med. Jour. for July 18, 1908.

"Professor R. Deutschmann of Göttingen (now of Hamburg), in his endeavors to evolve a preparation against infectious conditions of the eye, noticed that if horses were fed with increasing doses of sterile yeast for a definite length of time, they acquired a greater power of resistance against microbic infections. With the object of utilizing this fact in the treatment of infectious diseases, Dr. Deutschmann was led to draw from the blood of animals thus treated a serum, according to the usual technique.

"Thus far the results obtained have encouraged him and others, who have been using the serum for the last year or so, in the belief that a valuable weapon has been added to the armamentarium of physicians and surgeons in their combat against local or constitutional infectious diseases.

"Deutschmann's serum is not a bactericide or an antitoxin; it is a polyvalent serum neutralizing germs of all kinds; not germs of one kind only. Its action is due to the introduction into the circulation of yeast-fed animals of an as yet unknown substance, which seems to be an ultimate result of a series of chemical reactions set up in their digestive apparatus. As long as the animal's health is normal, this unknown substance remains in the circulation unchanged and unutilized. If, however, the animal is exposed to a bacterial infection, the cells of the yeast-fed animals will take up this unknown chemical substance, which, by imparting new energy, increases their resistance to the bacterial invasion of the organism. The same action takes place if a serum from yeast-fed animals is injected into a patient suffering from microbic infection. The strengthening of the cells and their increased resistance put the infected body on the same plane as that of a healthy one able to defend itself against invading micro-organisms.

"Deutschmann first employed his serum in a large number of traumatic or post-operative infections of the eye. But soon other German practitioners used his serum in cases of infection with staphylococci, streptococci, pneumococci, or their toxins, and it not only exerted a very favorable influence upon the patient's general condition, but also shortened the progress of the disease itself.

"In apyretic conditions, the injection of 1.5 to 2 c.c. of serum has no influence on the temperature. In acute infectious febrile affections the temperature falls gradually but continuously, and in six to twelve hours reaches the lowest point. At other times, in the first two or three hours after the injection the temperature rises somewhat, to fall two or three hours later. In some instances there is a less decided drop in the temperature; it rises again the day following the injection, to fall the third day without another injection; and this fall remains when the case is to terminate favorably. The frequency of the pulse is

moderated, becoming regular, fuller, and stronger. Veterinary surgeons (Dr. Wolf of Cleve, Germany) have noticed in animals an increased secretion of urine and a manifestation of well-being.

"The injection is usually given into the cellular tissue. When injected into the muscular tissues preference should be given to the pectoral or abdominal muscles. The serum may be given per rectum instead of subcutaneously."

The question of dosage is discussed, and cases are cited.

HYDROTHERAPY.

EDITED BY CURRAN POPE, M. D.

The Influence of Sea Air and Sea Baths on Metabolism.

Loewy and Müller (Archiv f. d. ges. Physiologie; translated from the Blätter für klin. Hydrotherapie) examined three cases on several successive days, noting the volume of the respiration, the amount of carbonic acid exhaled, and the quantity of oxygen employed. They concluded that sea air and baths have an influence upon these factors similar to that of high altitudes. In the first case, a woman suffering from chlorosis, the influence of these factors upon the exchange of gases could not be determined. In the second case that of a quite fleshy man of medium strength, a stay at the seashore of even a few hours led to a noticeable increase in the exchange of gases, but this was only temporary. In the third case, that of a strong, rather fleshy man, the increase of exchange of gases was manifest from the first, and remained fairly constant during the whole stay. As to the influence of the baths, the first case showed a slight reaction, the second a positive one, and the third was influenced permanently.



THE ELEMENTS OF PHYSICAL THERAPEUTICS.

BY THE EDITORS OF "ADVANCED THERAPEUTICS."

This department includes the department of queries, and is added to the Journal for the purpose of giving assistance to beginners in the use of Physical Therapeutics.

(Continued from page 490.)

CHAPTER VIII.

RADIANT ENERGY IN THE TREATMENT OF SIMPLE INFLAMMATION.

Treatment.—Radiant light and heat and to a less degree convective heat are eminently successful in meeting both indications. Applications of radiant energy from either the smaller lamps of 50 c. p. applied as near the surface as can be borne, or lamps of higher c. p. from 15 to 20 minutes or longer if pain is not relieved, every 3 to 12 hours according to severity, the recurrence of pain being the indication for repetition of treatment. When convective heat is employed the heat should be maintained at as high a temperature as can be borne, for from three to five hours consecutively, and repeated for a like period if there is any recurrence of the pain. The radiant light and heat application is the method to elect, convective heat only being permissible in lieu of the preferred method not being at hand.

In chronic otitis media frequent short exposures of the x-ray may be made on every second day for ten minutes, alternated with radiant light and heat for half an hour to an hour. Or a more approved plan is to make one exposure of the x-ray for 20 minutes, followed after 18 to 24 hours by prolonged intense daily treatments with radiant light and heat until the discharge of pus ceases. Except there are necrotic ossicles this plan of treatment will effect a cure in most chronic cases within three weeks. The additional application of high frequency currents over the *mastoid* and in front of the tragus will hasten the recovery in severe cases.

Mastoiditis.—The same plan of treatment, including the application of the x-ray as described above, will in the early stage abort this distressing condition, as has been demonstrated

in the writer's experience and that of others, as the following cases attest.

Dr. T., dentist, came under observation after having had an otitis media for three months with no sign of abatement. She came under treatment with the consent of the aurist under whose care she had been on account of her desire to go abroad in five weeks, and having no assurance that other treatment would relieve the condition. On the day that she applied for treatment she had forcibly injected water into the middle ear and came the following day with a developed mastoiditis, with pain and marked tenderness over the mastoid, and the outer ear standing out in the characteristic manner. Having employed the x-ray for 20 minutes on the first day, on the next day, when she came with the mastoid involvement, light from a high candle power incandescent lamp was administered for about 30 minutes, until an intense general hyperemia was induced over the region, followed by 15 minute application of the high frequency current with a glass vacuum tube. This application was made twice daily for three days when the mastoid complication had entirely subsided, improving from the first application. Treatment was continued daily for three weeks in the same manner when the discharge of pus had ceased and she was pronounced cured by her previous attendant, who by letter commended the method and result, acknowledging that both a mastoiditis and the otitis media had been cured.

The following cases were reported by Dr. Herbert F. Pitcher of Haverhill, Mass.*

"A case of mastoiditis was cured in five treatments. This case, a woman, thirty-six years of age, had been treated a week by the usual remedies before I saw her. She complained of very severe pain in and around the ear and mastoid, with tenderness on pressure and pain on percussion over the mastoid bone. The membrana tympani was red and inflamed, and temperature 100.2°, without chill.

"Application of strong light was made over the mastoid, in and around ear, side of the face, head, and neck of affected side for fifteen minutes. She returned next day with a report of a good night's rest, but some pain yet. Another application, the

* Phototherapy in General Practice, *ADVANCED THERAPEUTICS*, June, 1906.

same as before, was made. The patient said there was absolutely no pain when she left the office, and there was no pain whatever after that. She received three more applications with complete subsidence of the inflammation, and there has been no trouble since.

"A man, sixty-three years of age, weighing 240 pounds, had the grippe, followed by severe pain in right side of his head and ear for three weeks. The last week the pain was so severe he could neither sleep nor eat. When I saw him he was a wreck. There was a profuse purulent discharge from the ear, the membrana tympani was ruptured, and the typical conditions with the symptoms of acute purulent otitis media. After thorough cleansing of the canal I applied the light for fifteen minutes to the painful side of the head and neck, and into the orifice of the external meatus.

"The patient returned next day saying that he had had the first good night's rest for three weeks. He received six treatments with the result that pain and inflammation have entirely subsided, discharge ceased, and the patient was feeling as well as usual. There has been no return of ear trouble.

"I could enumerate many cases of like conditions and results. It is a source of great satisfaction to me to be able to relieve and even cure poor suffering humanity of a disease at once so painful and possibly dangerous to the loss of hearing and even life itself.

"I do not contend that it will cure all cases of severe inflammation of the middle ear or where the mastoid has become affected, needing operative relief. But if the light could be used in the early stages it would abort the inflammatory conditions in most cases."

Carbuncles, furuncles, felons, suppurative tonsillitis, and all abscess processes in the early stages are promptly aborted by essentially the same procedures as that employed in the treatment of otitis media, and after evacuation when the presence of fluctuation indicates it, or after evacuation by the natural method, no means is so effective in restoring the conditions to normal and removing all latent infection which might otherwise terminate by extension of infection in a series of abscesses or furuncles, as radiant energy, light, heat, the Roentgen ray and high frequency current systematically employed.

Another method, however, may be indicated in the first 36 hours of pyogenic infections, *i. e.*, to follow a prolonged application of radiant energy with a ten minutes administration of direct static vacuum tube current (employing the same connections with the vacuum tube as with the metal electrode with the wave current) directly to the indurated area. By the effect of this method the induration is dissipated and the phagocytes get at the germs and destroy them when the extent of infection is small. The danger of this method is in letting out the infection when the local resistance or phagocytosis is not sufficient to overpower the vicious element, but is small indeed in the early stage.

The results are so uniformly successful by these methods, that in but rare instances, and under exceptional conditions, is failure possible, where the technique is properly carried out.

Tubercular arthritis, associated with the x-ray and high frequency currents in accord with the rationale enunciated, are remarkably efficacious. When actual destruction of parts of the joint structure has not taken place, the prognosis from energetic treatment along the lines described, together with liberal judicious diet and approved general régime.

The *prognosis* is good, and the chance of benefit in all cases assured.

In tubercular adenitis the same régime and general prognosis obtains. The writer's method of treating this affection is to make one massive x-ray exposure to be followed after 24 hours by light and the high-frequency vacuum tube applications. The applications, except the x-ray, should be continued daily until all evidence of infection has disappeared.

Phlebitis.—There is probably no condition in which greater and more prompt relief can be obtained than in early phlebitis by the combined applications of radiant light and heat, followed in each instance by application of the static brush discharge. The writer has cured six cases by this combined method; two in cases of over two weeks' standing, and the others of shorter duration. In each case the veins became patent and the recovery was complete after from three days to two weeks daily treatment. The light from a high c. p. lamp was applied for from 15 to 20 minutes, followed by a thorough application of the brush discharge over the indurated veins.

Pelvic Congestions.—Over various regions of tenderness in the lower abdomen intense local light and heat radiations afford marked relief and eventually seemingly relieve some internal conditions. This observation is pertinent because it is the experience of many observers that radiant light and heat increase peristalsis, the bowels being frequently stimulated to movement after an energetic administration of light.

Cleaves has also employed light with a specially devised lamp *per vaginam* from which she has reported favorably.*

Orloff of Russia and Makarejev have also reported favorable results from the employment of White light to the pelvic tissues. These observations while important as showing the possibilities of light therapy, do not equal in point of efficiency the applications of the high frequency and static currents.

Desloges of Montreal reports a case of highly congested left ovary in a neurasthenic, treated by 20 minute daily applications of light from a high c. p. incandescent lamp, applied every other day for two weeks when the condition was cured and three months later there had been no relapse.

Curatulo "recommends phototherapeutics as a new therapeutical agent in obstetrics and the diseases of women. He describes a speculum which he has constructed in order to employ the different rays separately and combined. Therapeutic results may be expected in cases of metritis and hypertrophy of the cervix, in cases of badly developed uterus and peri- and para-metric exudates." †

Ozena is a condition difficult of treatment by light and readily and effectively treated by the direct static and high frequency currents with vacuum tube electrodes, but some writers have reported favorable results from the use of light reflected into the throat and nasal cavities.

Diosurio ‡ reports 16 cases of *ozena* under treatment with incandescent light reflected into the nose and by introducing a water-jacketed lamp in the nose or a larger lamp in the mouth. In every case he reports a noteworthy "decrease of the waste and secretion, and a disappearance of the characteristic fetor."

Cleaves suggests § the use of the arc light "in treating the

* Cleaves, "Light Energy," p. 55.

† Brit. Med. Jour., October 11, 1902.

‡ Gag. Med. Ital., February 6, 1902.

§ Cleaves, "Light Energy," pp. 547-550.

nasal, anal, and buccal cavities; with it a profounder influence is obtained, involving greater tissue reaction, when topically applied, by reaction of the complex chemical frequencies."

Post-Operative employment of incandescent light is one of the niceties of modern surgery. Radiant light and heat applied a few hours after an operation for from 10 to 20 minutes will remove to a large extent the diffuse soreness of the tissues, affording the patient great relief. Applied in the same manner over the dressings or better directly to the bared surface, it will promote rapid union, prevent scarring and delayed union. So valuable is this employment of radiant energy, that it should occupy a place as a routine practice in every well ordered hospital; where there is no reason that patients should not have everything conducive to their comfort, and a recovery in the shortest period of time.

Post-Operative Iritis.—A specialist reports following removal of a lense; five days after the operation a severe iritis occurred. "An exudate filled the entire pupillary space, and organized secondary membrane formed; and vision, which was good on the fourth day, was reduced to the barest perception of strong electric light. At first atropin, donin, and local heat were used night and day with apparent improvement, when an incandescent lamp of high candle power was installed with which the patient was treated every four hours for ten minutes. The relief from pain was prompt, the swelling and discoloration of the iris changed promptly, improvement setting in at once. At the end of two weeks the iris had recovered, and the exudate and secondary membrane had been reduced to the extent that a secondary operation, usually necessary after several weeks, especially following iritis, was undertaken. The operation was successful in opening a beautiful black pupil. As a precautionary measure the lamp was used a few days following the secondary operation, when the patient was discharged with no signs of iritis, secondary cataract, or other untoward result."

CHAPTER IX

RADIANT ENERGY IN DERMATOLOGY.

Radiant energy plays an important rôle in the treatment of diseases of the skin, for upon this superficial organ the energy of radiant light and heat are largely expended.

Atonic conditions associated with infiltration or impaired metabolism, or infectious processes are all favorably affected by the employment of radiant light and heat either alone or in conjunction with high potential effleuves, static brush-discharge or vacuum tube applications of high-frequency currents. These measures act by increasing local hyperemia and tissue activity with restoration or increase of elimination, affording the tissues increased nutrition and general functional metabolism and removal of edema or infiltration.

The Roentgen ray in certain infectious processes, followed by radiant light and heat after the requisite degree of inhibition has been effected, is more effective in infectious and malignant conditions of the skin, than the administration of radiant light and heat alone. In some infectious processes, particularly superficial streptococcic or staphylococcic processes, the early employment of radiant light and heat and high-frequency currents will be effective.

The following report of cases and methods will give the best idea for the indication of methods and treatment of various skin diseases.

Varicose ulcers.—The pathological condition resulting in varicose ulcer is one of induration and edema in the skin and subcutaneous tissue in which the parts most remote from the sources of nutrition break down leaving an ulcerated area, which is prone to increase in size as the region of induration widens and becomes more impervious to the circulation.

The indication is plainly (1) to get rid of the induration; (2) to stimulate active local metabolism with hyperemia, and (3) to support the tissues and prevent recurrence.

Treatment.—No agent known to the writer is so energetic in removing the local induration and tissue infiltration as the static brush-discharge applied daily, following a prolonged application of radiant light and heat. The brush-discharge should be applied each day until the involved tissues are well softened. By this method it is surprising how promptly the process in early cases is healed and with perseverance in nearly all cases they are ultimately healed.

The supportive treatment consists in the firm application of a firm elastic bandage with a splint of veneer or firm paste-board or perforated metal over all; the surface having been dusted with bismuth subnitrate and covered with a thin layer of

gauze over which is placed one thickness of absorbent cotton. After the surface is healed, a firm elastic bandage such as the *crêpe velpeau*, an English production, should be constantly worn and the area daily massaged to prevent recurrence.

Case 1. Miss B., æt. thirty, came under observation referred by a physician in a neighboring city, with a varicose ulcer which had been increasing in size for more than a year. It was circular in form and about one inch in diameter, surrounded by an indurated area about six inches in diameter, and surrounded by a general edema below the knee. Twenty-minute applications of intense radiant light and heat, followed by a daily energetic application of the static brush-discharge and the employment of bandage applied from the toes to above the knee, were employed daily.

When treatment was instituted surrounding the ulcer was a margin about one inch in width of livid degenerated skin on the verge of breaking down, which rendered healing of the ulcer relatively slow. The improvement was prompt and in six weeks the surface had entirely healed, being covered with a normal skin. This patient was then discharged with directions to continue to wear the bandage, and give the limb a daily massage, removing any commencing infiltration or hardening.

Case 2. Mr. McD., æt. 63, came under observation in January, 1908, with an extensive ulceration of practically nine years' duration on the left leg, about midway between the knee and foot.

The open areas were one large ulcer about two inches in diameter and three smaller ones around it, with a tissue area fully four inches in diameter about to break down. The extremity below the area was livid and cold, resembling Renaud's disease and the leg from four inches below the knee was infiltrated, cold, and edematous. The second toe was about black, and the nail separating. The extensors of the toes were contracted to the extent that the end great toe and all of the smaller ones, when the patient stood upon them, did not come to within three-quarters of an inch to one inch of the floor. On the left foot one inch forward of the external malleolus was an ulcer about three-quarters of an inch in diameter, and though not so generally edematous, was livid and cold, the foot with the extensors of the toes contracted as on the right leg.

The treatment of this case consisted of the prolonged daily applications of radiant light which was manipulated by the patient for from one-half to three-quarters of an hour daily, followed by thorough application of the static brush-discharge which removed the induration daily. The surface of the ulcer, which was inactive and of a venous hue, became active and of an arterial hue after the first treatment, indicating the opening up of the arterial channels to the influx of blood to the margins of the ulcers. The surface was dressed each time at first with vaseline and later with subnitrate of bismuth, a layer of gauze, a layer of absorbent cotton, a flexible board splint large enough to protect the affected surface, and over all a *crêpe velpeau* bandage extending from toes to knee. The small ulcer on the left foot was healed in two weeks and the improvement in the large one was marked and progressive though slow. Treatment was given daily except Sundays for three months and on alternate days for the following two months, when the ulceration was entirely healed. The second toe and feet resumed normal color within two months. A healthy, normally vigorous nail grew upon the second toe of the right foot, and contractures of the extensor muscles of the feet became relaxed so that within two months the great toe came normally to the level of the foot.

When treatment was begun the patient, who for months had been seated in his room with his foot elevated, came once in a cab and afterwards by the street car, and was rendered comfortable and relatively free from pain at once on the institution of treatment. This patient had been in the best hands on two continents for five years, during which time all previously recognized methods had failed, marking it as one of unusual severity.

Suppurating Ulcer.—Dr. J. A. Mohnson reports the following case: Male, æt. forty-five, who in November, 1904, ran a barbed wire into his elbow, which was neglected, resulting in a chronic infection. In September, 1905, there were seven suppurating ulcers with thickened edges, covering a surface six inches long by four broad. The whole surface was tender and indurated and of a bluish color. The condition was treated with a 500 c.p. incandescent lamp, exposures twenty to thirty minutes each, the lamp brought down as close as it could be borne, with an occasional "hot one" within a few inches of

the affected surface. In all seventeen treatments were given. All of the ulcers were healed though considerable induration remained.

Lupus and Allied Conditions.—"Rieder of Munich says that in order to utilize electric arc light for therapeutic purposes in skin affections, it must be more concentrated, than from a reflector. This was first overcome by Finsen (1893). Strong currents and concentration of the light by quartz lenses as well as elimination of the heat rays are necessary for an intense effect of the arc light.

"There has always been a tendency to create new light sources, apt to produce more chemical rays than the old sources do. But only the so-called iron lamps have been of any account. The rays of the iron light have a strong irritating and bactericidal effect, combined with moderate heat-radiation, but they possess very little of the quality of penetration. Therefore deep-seated affections of the skin—for instance, lupus—are not affected by this light. On superficial diseases it is very effective.

"The question, whether the heat rays are of use in curing skin diseases, is nowadays generally answered in the affirmative, but Rieder is skeptical and points to the Finsen method which is of cold light; for behind the water-cooled compression-lenses, there is nevertheless heat produced. This light seems to be a lucky combination of light and heat rays.

"It is absolutely necessary to produce a slight reaction in the skin before beneficial results may be expected. There are four stages of reaction; hyperemia of the skin, painful blistering, superficial ulceration, necrosis with the formation of ulcers."*

"Morris and Dove compare their results in the light treatment in lupus and other diseases of the skin with those of Finsen. Finsen gives in lupus 94 per cent. and in epithelioma 50 per cent. cures. The results of Morris and Dove are not so favorable. From 65 cases of lupus in treatment 11 remained for two years without recurrence. Improvement took place even in the worst cases. They used for the skin the Finsen lamp and for mucous membrane Roentgen rays. In 11 cases of lupus erythematosus 7 remarkable improvements were recorded. In 27 cases they improved very well. Two cases

* Wiener med. Presse, 44, 1903, pp. 2074, 79.

of alopecia did not improve. Patients should be kept under observation for at least three years." *

"Moller of Stockholm reports results of phototherapeutic treatments of the St. Goran Hospital. Up to April, 1904, were treated 113 cases; 79 cases of lupus vulgaris, 17 lupus erythematosus, 12 carcinoma cutis, 3 alopecia areata, 1 nevus vasculosus, 1 acne rosacea. In the lupus cases light treatment proved to excel all other methods. Of the 32 completed treatments 17 cases were cured, 10 almost cured, 4 improved, 1 hardly influenced. The treatment was either pure light treatment or it was assisted by the application of salves or galvanocaustic puncture, removal of tuberculous glands, etc. In cases of lupus erythematosus the infiltrated forms reacted well, while the superficial ones showed no results. Of 12 cases of skin carcinoma, 7 were cured. Two cases of alopecia areata were cured." †

"Schaltz of Berlin contends that in treating lupus vulgaris with chemical rays the heat rays play a conspicuous part. If, for instance, on an agar-layer is placed a Finsen cooler and through this is illuminated with a concentrated electric arc lamp, the agar-layer will melt on the back-side, but not on the side exposed to the light source. From this and other experiments the author concludes, that the cooling of the skin is only superficial and that the heat is in action in the deeper layers." ‡

"Lesser of Berlin reports on the light treatment of skin diseases after the Finsen method and says that two qualities of the light are to be considered, i. e., the tissue-destroying and hereby inflammation-causing quality and, secondly, the bactericidal quality of light. In fact, those two qualities are combined in one and the same process when certain light rays destroy a cell in the human body or when they kill bacteria, as each micro-organism is nothing else than a living cell. The more a method is destroying the affected without attacking the healthy cell the more it is nearing the ideal requirement. At the University of Berlin are used Finsen apparatus of 30-40,000 candlepower (48-50 volts, 70-80 amperes) mostly in the treatment of lupus

* Practitioner, 1903, April.

† Norcisk medicinsk Arkiv., 1904, No. 10.

‡ Berl. klin. Woch., 1904, No. 18.

cases, and although the exact results are not yet available, the superiority of this method over others is established."*

"Teredde reports the results from phototherapy in 11 rebellious cases of lupus erythematosus of the face. Of these 3 were cured, 2 were benefited to a marked degree and passed from under treatment. Of the 6 patients remaining 4 were being cured and 2 showed no improvement. He regards this method of treatment the best for grave forms of the disease."†

"Schamberg of Philadelphia gives his results in treatment of various diseases by Finsen light and Roentgen rays.

1. Finsen light is beneficial in the treatment of lupus vulgaris; but large lamps are required.

2. In lupus erythematosus Finsen light effected some improvement but no cures.

3. In certain cases of lupus vulgaris (ulcerated nodules, when mucous membrane of nose, lips, or mouth is affected) the Roentgen rays are preferable.

4. The Roentgen rays have certain distinct limitations in the treatment of cancer of the skin, when not deep-seated.

5. Roentgen rays are very valuable in acne.

6. Roentgen rays are valuable in eczema.

7. Roentgen rays have proved beneficial in sycosis, lichen planus, hypertrichosis, ringworm, and favus of hairy regions, tuberculosis of the skin, mycosis fungoides, etc.‡

"Pick and Asahi of Prague have treated after the method of Tappeiner and Jesionek 12 cases of lupus, 2 cases of tuberculosis cutis verrucosa and ulcus rodens, 5 cases of trichophytosis and 3 cases of scrofuloderma. The affected parts were in the morning brushed with one per cent. solution of eosin in a physiological salt solution. During the day these parts were repeatedly moistened with a salt solution in order to avoid drying in, and as much as possible exposed to the sun; over night the parts were covered with an indifferent salve bandage. the results were in all cases very encouraging. In cases of lupus the inflammatory infiltrations receded and the process of cicatrization made fast progress; the cases of trichophytosis healed in a few days."§

* *Zeit. f. Diat. & Phys. Ther.*, Vol. 5, 1902, pp. 449-457.

† *Bul. Gén. de Thérap.*, January 23, 1901.

‡ *American Medicine*, December 19, 1903.

§ *Centr. f. d. med. Wissensch.*, 43, 1905, p. 158.

Eczema treated by radiant energy is generally effective and in other cases it adds greatly to the efficiency of local applications. No agent is so efficient in the writer's experience as the local applications of the static brush-discharge for removing the local induration or infiltration of eczema either alone or following local applications of radiant light and heat; and when persisted in, it is generally effective. Excellent results have been effected by numerous observers from the use of radiant light and heat.

"Winternitz of Vienna claims to have proved conclusively that the effects of sun and electric light are not simply of thermal character. For example, the elimination of the chemical rays with a transparent red material is sufficient to make the high temperature in an electric bath endurable. This phenomenon induced Winternitz when applying sun baths to cover the part of the body which was exposed to the sun, or the whole body, with red clot. The results of this measure were diminution of chronic skin hyperemia, anemization of hyperemic portions of the skin, improvement and cure of eczema."*

Desloges reports a case of eczema of eight years' standing covering much of the body to which for several weeks high-frequency currents were applied to the hands with success. To the eruption still remaining on the legs and surface of the body generally the high candlepower incandescent lamp was applied. The redness gradually disappeared and the scars separated, leaving the skin clear and in a normal condition after three weeks. The applications were made for twenty minutes morning and evening. Two years later there had been no recurrence.

Eczema moist of hands. Dr. Walter of Kramer, Ind., reports in a man fifty years of age. First attack involving hands and wrists with severe itching and exudation of serum from cracks and fissures made no improvement from wearing white gloves and various ointments, and washed during six weeks' treatment. After two weeks' treatment with the leucodescent lamp every night, made a complete recovery. Improvement was noted from the seventh treatment. This case had had treatment from able dermatologists.

Psoriasis.—Dr. Walter of Kramer, Ind., reports over thirty

* Bericht. u. d. 22 off. Versaml dr. Balneol. Gessellsch. Zu Berlin, 7-21 Murz, 1901.

cases of psoriasis cleared up during two years with the high candlepower incandescent lamp. He states that results begin to show in from ten to twenty daily treatments, and that thirty to forty treatments extended over a period of six weeks should be given, taking an hour for each treatment when the entire body requires treatment. Under this plan he states that spots clear up in the center and become more pink and then fade away. Subsequent treatments when small spots return will keep it from reappearing.

He emphasizes the statement that if cases are treated for from six to eight weeks making exposures of from fifteen to thirty minutes to each part, cases of psoriasis will completely respond. These statements are made from an experience with from thirty to fifty cases during three years in an institution where such cases congregate.

Steiner of Leipzig reports results in electric light treatment. He used concentrated arc light. In cases of furunculosis and sycosis barbæ no results. In cases of psoriasis the results are doubtful. Cases of scabies were cured with three applications. Pityriasis versicolor disappeared after five applications. Prurigo ceased after two baths. Grave cases of impetigo were cured with eight baths. Very grave cases of chronic dermatitis cruris were cured after seventeen applications. Cases of seborrheic eczema were cured after four baths. Chronic eczema was cured. Steiner gives the clinical history of thirty-two cases confirming his claims.*

CHAPTER X.

OPPOSITE EFFECTS OF RADIANT LIGHT AND HEAT AND THE ROENTGEN RAY.

The study of the different forms of radiant energy reveals a variety of action and effect which indicates a diversity of application to therapeutics. The influence of the frequency of vibration to penetration, the degree of penetration, diminishing as the frequencies increase, until the higher frequencies of the Roentgen ray are reached.

"It was predicted by Helmholtz, the great mathematician," says Sir Oliver Lodge, "that if waves could exist still smaller,

* Munich med. Woch., 52, 1905, pp. 748-51.

you would ultimately get waves smaller than the atoms, and that then, instead of being bent more, would be bent less ; and in that way we should have the upper part of the spectrum with dispersion reversed—the spectrum at last folding back upon itself, until, you come to the ultimately small waves, they would not be bent at all, but would go straight on. The prediction was fulfilled in the x-ray, which is not refracted, but goes straight on, and is constituted of the shortest wave-lengths, excessively rapid, and waves smaller than anything conceived before. Fulfilling the theory of Helmholtz these rays go straight on.”

It was observed by the writer in a paper published by him,* that a remarkable contrast exists between the ultra-violet and the x-ray. The latter, of varying wave-lengths, are not sorted out from one another—are not refracted, but go straight on without any deviation whatever.

Sir Oliver Lodge describes the x-rays as follows: “It is simply a solitary wave, a solitary pulse, up and down almost instantaneously, and no more; nothing continuous, not a succession of waves—a solitary pulse, one splash like a whip-crack, just again and again. With every blow of an electron the derived x-rays proceed from the target in very rapid succession, in all these flashes or cracks, because the electrons or cathode rays are bombarding the target in very large numbers.”

It will be readily seen therefore, that the characteristics of the Roentgen ray differ materially from those of radiant light and heat radiations, both in the character of wave-length and the method of discharge or irradiation, which from a physical point of view accounts for their different action upon the tissues. The effect must be looked at also from another point of view with reference to their impingement or absorption by the tissues. In the matter of radiant light and heat rays, which do not pass through dense and deep tissues, their energy being spent when some or all have passed to a depth relative to their wave lengths. While the penetrations, particularly the lower frequencies are considerable, they are generally absorbed before passing through the body upon which it impinges, while the x-rays pass through. It must also be taken into consideration, that the density, or volume, or number of these radiations from the sources of radiant light and heat, are very much more num-

*“Comparison of Forms of Radiant Energy,” Archives of the Roentgen Ray for December, 1906.

erous than from the sources of the x-ray. The heat effect therefore, of the forms of radiant light and heat, are pronounced whereas a large percentage of the radiations from a modified Crookes' tube pass directly through the tissues, producing relatively little, if any heat from the effects of absorption, or spent energy. Another factor must be taken into account with reference to these radiations—the effect of passing through the tissues in the interspaces between the cells, as suggested by Helmholtz, and confirmed by Sir Oliver Lodge, would be liable to produce an effect upon the cell bodies; because the other ethereal vibrations, as evidenced by the effects of radiant light and heat, possess an energy within themselves, capable of affecting cell protoplasm. It is probable, on account of the intense rapid vibration of the penetrating Roentgen rays, that they profoundly affect cell protoplasm, as first observed in a previous work of the writer * in which the Physiological Effects of the Roentgen ray were considered as follows:

“The study of the actions of the x-ray is the study of the effects of form of vibration—agitation of the ether of the highest recognized intensity. It is an invisible force, and, like other invisible forms of vibration, can only be comprehended by the results arising from its actions.

“The *physical characteristics* are as follows:

“I. They penetrate many substances which absorb the visible rays of the spectrum.

“II. They are refracted † when passing from one medium to another of different density, but very slightly.

“III. They are but slightly reflected, and are absorbed by substances which they do not penetrate, and cause others to fluoresce.

“IV. What the peculiar effects of the rays may be upon the protoplasmic structures of the body as they pass through the tissues can only be determined from the conditions arising, which are as follows:

“(1) As one stands before the radiating tube with the rays penetrating the body, there is little perceptible sensation. It may have been noticed, however, if the hand be held before the tube for several minutes that a sensation of gentle contraction

* “Static Electricity and the Uses of the Roentgen Ray,” p. 220.

† Recent convincing reports affirm that the x-rays are slightly refracted, contrary to Roentgen's first statement.

of the skin is perceptible. The statement of this fact is not uncommonly made by patients under treatment by the x-ray, and it is so from the writer's personal observation.

" (2) It is also observed that the surface of an ulcerating cancerous growth appears as if glazed or as covered with a thin coating of collodion after an exposure of several minutes.

" (3) The substance of a growth, when standing prominently above the surrounding surfaces, is also perceptibly contracted.

" (4) Following a series of exposures it has been observed by all familiar with the subject that the skin becomes atrophied, and the hair follicles and sweat glands become inactive—hair falling out and secretion of sweat ceasing.

" (5) Pain is in most cases relieved to a remarkable extent after a few exposures in various inflammatory and malignant conditions.

" (6) Congestion is evidently diminished, and is indicated by the relief of conditions which could be explained under no other hypothesis, occurring, as it does, when inflammatory conditions are exposed to the influence of the rays.

" (7) Long or repeated short exposures produce dermatitis and necrosis, deep or superficial, according to the length of exposure.

" The above propositions, jointly and severally, point strongly to one effect in particular, which accounts for all—the *contraction of cell protoplasm*. The sense of contraction of the normal skin, the glazing and contraction of an ulcerating surface, the atrophy of the skin, and the relief of pain and congestion are all indicative of tissue contraction. Indeed, it is the most plausible explanation of the impaired nutrition, for necrotic and sloughing tissue, normal or diseased, betokens a diminished blood supply—local anemia; due to the consequence of the contraction of the muscular coats of the vascular system. Whether the action is the influence upon the end plates of the neurons or upon the individual cells it would be difficult to assert; but the latter is most probable."

The writer in a former contribution * presented a statement of the results of the action based upon clinical observation:

* "The Uses of the X-ray and Accessory Measures in the Treatment of Diseases of the Skin," JOURNAL OF ADVANCED THERAPEUTICS, June, 1903.

"That the effects of the x-ray upon the normal tissue are (1) to induce normal activities, due to the vibratory effect of the rays, or of the ether in the presence of the rays. (2) That these effects with short exposures at proper distances with high vacuum tubes induce activity of normal tissue cells, which, in some cases, supplant abnormal tissue elements without evidences of disintegration. (3) That exposures destroy only the abnormal tissues unless they be too prolonged. (4) That abnormal tissue thus exposed breaks down and disappears through the natural channels of absorption or by sloughing." It has been shown in the writer's experience that tissues of low vitality are always the first to break down.

"It is probable that the vitality of all tissue is lowered by cutting off the blood supply as well as by inhibition induced in the cells. *Naturally*, under such circumstances, tissues of low vitality are the *first* to break down. It is also well established that the tissues of debilitated patients do not resist the destructive action of the rays as do those of normal individuals, which confirms the theory.

"It has also been demonstrated that malignant tumors in the aged or infirm are more likely to soften and break down than in normal individuals, which confirms the view that when for any reason the tissue resistance is lowered the tissues break down. The violent toxemia occurring under such conditions is not due to extension of the malignant process, but to the auto-infection arising from absorption of toxins present in the broken-down structures.

"This effect upon circulation and nutrition when employed to the extent of destroying malignant growths is at best a dangerous one, and demands careful attention to the management of details and a knowledge of their consequences.

"*The cumulative action* is a striking feature of the effects of the rays and demonstrates the more or less persistent condition of contraction which follows a series of exposures and explains the diminished metabolism after long exposures or series of exposures.

"It would seem, therefore, that the logical explanation of the action of the x-ray when nearby, prolonged, or frequent administrations are given is, that the exposed structures contract at the expense of nutrition and produce, when carried to a certain degree, necrosis of the part. This theory accords with

the therapeutic results obtained from nearby and prolonged exposures.

"The stimulating or tonic effect of the Roentgen ray, induced by short exposures or with a high-vacuum tube at distances of sixteen to twenty inches from the anti-cathode, is probably due to the disposition of the vibratory influences of the rays first to overcome local stasis, restoring tone to the muscular coats of the arterioles, and at the same time inducing a more active local metabolism.

"A knowledge of the action of all stimulants teaches that their employment must be judicious or the opposite effects will result. So with the x-ray, to obtain the tonic action, exposures must be infrequent (not oftener than twice weekly), with penetrating rays emanating from a tube usually at a distance of from twelve to twenty inches. The length of exposures under these circumstances may be for the usual period of ten minutes."

The inhibitory actions from prolonged exposures are effects, which we are considering as antagonistic to the stimulating effects of radiant light and heat from short or prolonged exposures. The stimulating effects of the Roentgen ray as referred to are not generally employed for the reason that the other forms of radiant energy best conserve that purpose. These views expressed by the writer in 1904 have been in the experience of many observers verified; and while to the present time no other definite physiological effects have been published, the general consensus of opinion is drawing to the recognition of the part contraction of protoplasm plays.

Since these observations were made, it has been further demonstrated that the tissue inertia induced from the inhibitory action of the Roentgen ray, points to another very significant effect, which is likewise best explained by the condition of tissue inertia following the profound effects upon protoplasm, in response to the intense vibratory influence of the penetrating rays; that is, the effect upon the procreative functions in mammals as well as in the lower forms of germ life. This fact was referred to by the writer in an editorial* on The Actions of the X-ray upon Animal Tissues, as follows:

"The physical characteristics of the x-ray, as generally accepted by physicists, precludes the acceptance of the idea of ionization or that the rays possess any electrical qualities, except

* ADVANCED THERAPEUTICS, March, 1905.

peculiar characteristics which can be derived from no other source. They are lines of longitudinal ether vibration (not Hertzian waves) transmitted in straight lines from a source of great energy, possessing qualities whereby they penetrate solid bodies indicating an expenditure of the energy derived, which may be either entirely spent upon bodies of too great density or absorbed in varying degrees in their passage through objects of different densities. Under the laws of conservation of energy when projected against animal tissue this force is spent upon the tissues, exerting characteristic influences—the effects of the x-ray.

“ There are three hypotheses upon which the results of these exposures which are so little appreciated by the profession to-day, might be explained. (1) It is probable that cell protoplasm is affected by the stimulating action of these energetic lines of vibration to a state of contraction that suspends activity in varying degrees depending upon the duration, frequency, or intensity of the exposures. Under this hypothesis nutritive processes would be suspended by lessening or discontinuance of the metabolic processes and at the same time by diminishing or cutting off of the local blood supply owing to the contraction of the cells which comprise the muscular coats of the arteries. In this connection it is a well authenticated fact that the action of the ray is cumulative, that the extreme degree of physiological effect is not reached except the exposure is prolonged or of great volume or intensity, or at the termination of a series of exposures.

(To be continued.)

SOCIETY MEETINGS.

SEVENTEENTH UNIVERSAL CONGRESS OF PEACE, LONDON, JULY 31, 1908.

Address made by Dr. J. A. Rivière, of Paris, President of the International Medical Association in Aid of the Suppression of War, at the Teachers' Conference, under the Presidency of Professor Sir John Macdonnell, C.B.

Hon. Chairman, Ladies and Gentlemen:

The spirit that animates the reunion to-day shows clearly the importance of the progress made in these last years.

This Assembly of Educators, forming part of the intellectual élite of a grand and free country, marks the incontestable progress towards the emancipation of Thought, and a sure advance towards Reason, hitherto obscured by Ignorance.

To remake opinion is to create a new current. It is difficult to make an impression on ripened age, and still more difficult

to create, in every respect, a fresh mentality in men already formed, deprived in their infancy of the benefits of instruction, and when the spirit of routine and ancestral habits seem to have rendered rebellious to the right comprehension of a justice without violence because based on Reason, which alone will rule the nations in an approaching future.

It is to the young brain, to that malleable wax of Thought, it is to the heart, to the sentiments of infancy not yet hardened by the torments of life, that it is necessary to give attention; to strike without tiring, to speak the language of equity, true justice and humanity. It is therefore not merely a question of the re-education of ripened age, but a new education, a new word to be taught from the cradle and from the school. Then will Humanity reap a rich harvest.

Become adult, man will practice wholesome theories learned in childhood; his conscience formed by logic will revolt against every attack on Reason, and when at times, on poring over the history of the past, his eyes fall on sanguinary pages written by the nations in the name of Right and Justice, an immense astonishment, a vast pity will take possession of his whole being, and he will wonder over the century which gave to the world the steam engine, electricity, aërial navigation; over the century which produced geniuses in the art of thinking, constructing, and curing, assisting powerlessly at the sanguinary strife of races and nations slaughtering each other to safeguard or impose a religion, a private interest, or perhaps a sentiment of pride and vainglory.

This education, this new morality which the man of tomorrow will make, it is your mission, gentlemen, to teach. That is why your rôle is so noble, and that here it is preponderant. That is why all right-minded men, all men of good will, have their eyes fixed on this group of generous souls that you form here, and who, by your strict union, your enlightened spirit formed by the experience of Wisdom, will arouse the enthusiasm in the hearts of the young generations the words: "Justice and Humanity."

BOOK REVIEWS.

AN AID TO MATERIA MEDICA. By H. M. DAWBARN, M.D., Professor of Surgery and Surgical Anatomy, New York Polyclinic Medical School; Professor of Surgery, Fordham Medical College, New York; Visiting Surgeon to The City Hospital, New York. Fourth Edition, Revised and Enlarged, by EDEN V. DELPHEY, M.D. New York: The Macmillan Company; London: Macmillan & Co., Ltd. 1908.

The object of this little volume is to give a concise record of remedies, doses, and therapeutics for use of the student and busy practitioner.

The writer wisely calls attention to the fact that a very limited range of drugs supplies the need of the scientific practitioner; a suggestion which might be taken into consideration when the pharmacopeia is again revised.

Another wise suggestion contained in the preface is that "it is always unwise to use any medicament unless he knows the exact amount of all the ingredients."

The work contains a carefully prepared list of the unofficial drugs and remedial agents.

Some space is devoted also to the physical agents, including high-frequency currents, radio-activity, and light, as well as a consideration of the newer organo-therapy with consideration of the opsonines.

The work is alphabetically arranged, and the most complete and concise of its kind published.

BIER'S HYPERAEMIC TREATMENT IN SURGERY, MEDICINE, AND THE SPECIALTIES. A MANUAL OF ITS PRACTICAL APPLICATION. By WILLY MEYER, M.D., Professor of Surgery at the New York Post-Graduate Medical School and Hospital; Attending Surgeon to the German Hospital; Consulting Surgeon to the New York Skin and Cancer Hospital, and to the New York Infirmary, and Professor Dr. VICTOR SCHMIEDEN, Assistant to Professor Bier, University of Berlin, Germany. Illustrated. Philadelphia and London: W. B. Saunders Company. 1908. Price, cloth, \$3.00 net.

The writers of this work have adhered closely to the method employed by Bier of employing hyperemia in treatment. In the introduction it is stated, that the indications to be conserved in hyperemia as employed by Bier, the writers assuming that inflammation always induces an influx of blood where injury has taken place, an increased hyperemia is to assist the process, also maintaining that "blood must continue to circulate; there must never be a stasis of blood." Where the lesions are superficial in character, this may be possible; but in deep traumatic injuries of large joints, it is demonstrated that the induction of intense hyperemia by dry heat or the suction method is not capable of preventing stasis. In the previous works of Bier, he has conceded under the term "obnoxious stasis" a class of cases which according to the author are not amenable to hyperemic treatment. The writers evidently presuppose that the induction of hyperemia suppresses infection, but do not seem to have recognized, at least do not say, that the methods by hyperemia induce local leukocytosis; which by the method by dry heat and other means which increase local vascularity probably do, without impeding the circulation. The obstructive hyperemia, when conditions of infection are to be relieved, is certain to exist with a predominance of venous stasis; a condition unfavorable to positive chemiotaxis. The writers do not seem to have appreciated this fact; while other observers have obtained equally good results by measures which produce

hyperemia without the induction of stasis. From the point of view of Bier, however, not considering the subject broadly, the methods employed in this work are of the sort which are favorable to the treatment of septic infection, particularly the hot air treatment as previously described by numerous writers on thermotherapy; a method which is not novel, and which should not be constituted as a part of Bier's originated method.

The method by cupping furthermore, is not novel, except with the extreme measures employed in producing the results. The method described of evacuating abscess cavities by the suction method, is novel, as is also that of impeding the circulation by bandaging. This work deals with the method as employed by Bier, and is a step towards the general recognition of physical therapeutics, but does not cover so well as other methods the modern scope of treating inflammatory processes, infectious and non-infectious. The work is well written, fully illustrated, and from the point of view of the writers, an excellent contribution to the subject. The future, however, has greater things in store in the treatment of these conditions than the limited range of this method. The publishers have executed their work with their characteristic excellence.

NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

THE STANDARD SELF-REGULATING X-RAY TUBE WITH ADJUSTABLE ANODE.

The principal features of this new x-ray tube are the adjustable anode and the self-regulator.

As with the ordinary tube one is never sure of a proper focus, with the Standard tubes this focus may very accurately be adjusted after the tube is finished, and for this reason uniform results will be obtained with every Standard x-ray tube.

The regulator being adjusted in proportion to the distance between anode and cathode will make it impossible for the focus to alter, because the regulator will act as soon as the vacuum should change or as soon as more current is put through the tube than adjusted for; in both cases the vacuum would be reduced and by this also the focus. In using a special

method of exhausting the Standard tubes without the aid of a second anode, the vacuum will keep constant and not run up as in all of the present bianodal x-ray tubes. This feature making the Standard tube very valuable for therapeutic work.

For radiographic work the Standard tubes are provided with



a heavy anode and with a substantial platinum target, which will stand even the heaviest current used for instantaneous work.

Instructive pamphlet on x-ray tubes on application to Arthur Friedrich, 32 Union Square, New York.

The Journal of Advanced Therapeutics

Vol. XXVI.

NOVEMBER, 1908.

No. 11.

ELECTRICITY IN ERRORS OF REFRACTION.*

SAMUEL J. HARRIS, M.D., BOSTON.

The question of the use of electricity in errors of refraction is one practically of recent times. In looking over the literature of the subject one is struck with the appallingly small amount in existence. But little work has been done on the use of electricity in diseases of the eye and hardly any on electricity as applied to errors of refraction.

It was my success in the treatment of atrophy of the optic nerve, in glaucoma and embolism of the central artery, and the amelioration of sight in these cases, that first led me while investigating the uses of electricity in eye diseases to turn my attention to its use in errors of refraction. In errors of refraction I have used galvanism, faradism and the high-frequency currents, but for this paper I shall limit myself to the uses of electrical massage.

HISTORY.

Massage has been used in affections of the eye since the time of Hippocrates, but it was left to Donders¹ to formally introduce eye massage to the ophthalmologists at the London Congress in 1872. Pagenstecher² has done more than anyone else to spread the knowledge of this therapeutic agent. Pagenstecher's method of massage consists of "moving the lid as quickly as possible under slight pressure in a radial direction, starting from the center of the cornea, and after this by making circular friction by means of pressure upon the upper lid around and upon the sclero-corneal region."

Since 1872 Schenkl of Austria, Panas of France, and Gradenigo³ of Italy have contributed to the literature of this subject, but massage as practiced by these authors was for diseased conditions of the eye, and not for simple errors of refraction, and was practiced in an absolutely empirical manner.

* Read at the Eighteenth Annual Meeting of the American Electro-Therapeutic Association, September 24, 1908.

It has remained until within the last fifteen years for massage of the eye to be seriously studied, and this was first done by Maklakow,⁴ who published his first article on purely mechanical massage—Vibratory Massage—in September, 1893; for this purpose he employed Edison's pen, taking his power from an electric vibrator which is capable of giving 9000 vibrations per minute. The needle, armed with an ivory button, when applied to the ciliary region, provokes a partial contraction of the pupil on the corresponding side and sets the aqueous humor in movement.

The vibrations are transmitted into the depths of the eyeball, reduce intra-ocular tension, hasten the lymphatic circulation, and facilitate intra-ocular exchanges.

Priesberger⁵ of Stuttgart and Snegiurew⁶ have since published their results, the latest publication being that of Würdermann.⁷

Finally, it was with the introduction of massage by Dr. Domec⁸ of Dijon that we enter upon a new phase, rich in promise of being able to apply massage to errors of refraction. Dr. Domec describes his method, which is known as pressure massage, as follows:

"The end of each thumb, acting as a plug, is applied to the center of the cornea through the upper eyelid, the fingers being extended flatwise upon each temple. One soon acquires the delicacy of touch sufficient to feel if the cornea shifts about under the thumb, and at the same time the lightness of hand necessary to make the pressure successive and not continuous. The duration of each massage is about five minutes, with one or two intervals of rest, according to the individual sensibility. The pressure may be practiced quickly or slowly. Eventually 500 pressures are made in the sitting. It is necessary in asthenopia, scarcely to touch the eye at first, or the patient may give up the treatment after the third or fourth day."

Since the writings of Domec but little has been done, either abroad or in this country, in the investigation of this most interesting and important subject.

AUTHOR'S EXPERIENCE.

Since September, 1906 (during which time I had been studying the effect of electricity upon diseases of the eye), I have

conducted a series of clinical observations upon the action of various kinds of massage.

I at first began by using Maklakow's electric vibratory massage, then Domec's pressure massage; finally with the more perfected apparatus, I began using pneumo-massage, taking my power from an electric motor with pump attachment, and



Fig. 1.—Transformer and ear pump for eye and ear massage.

later using vibratory massage taken from the handle of one of our new electric vibrators.

I have found pneumo and vibratory massage almost of equal benefit and both superior to the ordinary pressure massage. The vibrations taken from the transformer and the vibrator are more accurate and can be better regulated than those of the ordinary digital pressure massage, as well as being much more agreeable to the patient, and I think both superior to digital pressure massage.

I often use both pneumo and vibratory massage on the same patient, usually starting with the pneumo and ending with the vibratory massage, excepting in cases where I wish to get very deep pressure; then I employ vibratory massage and use the vibrator placed in the palm of my hand, giving the vibrations through my forefinger on the eyeball, just over the cornea.

In using pneumo massage we may use a rubber-cupped massage handle, or may use glass eye-cups connected with the machine by a rubber tube. (The force is taken from a transformer and a pump attachment.)

The nipple of the pump is placed at a point two-thirds distance to the right, when we obtain vibration or alternate compression and suction. The force or gentleness of stroke is also regulated by thumb pressure over the hole in the handle. Great care should be exerted that neither the length nor the amount of the stroke causes any discomfort. The slower the stroke, the better it is. The best results are obtained with 50



Fig. 2.—Shallow cup vibratode glass.

to 250 vibrations per minute. The stroke varies from 0 to $1\frac{1}{4}$ inches, and the length of the stroke desired can be selected by a gauge attached to a crank pin. The rapidity of the piston stroke varies from 30 to 600 vibrations per minute.

In using the vibrator one may use a shallow cup-vibratode placed on the eyeball, or may place the vibrator handle in the palm of the hand, turning the lever to the first or second point, where we obtain about 400 vibrations per minute—the forefinger is placed upon the center of the cornea through the upper lid. Considerable experience, gentleness and skill are necessary to acquire the delicacy sufficient to feel if the cornea shifts about under the finger, and at the same time the lightness of hand necessary to make the pressures successive and not continuous, for irreparable injury may be done, such as retinal detachment, unless one is extremely careful, and I believe this method should be practiced only by an expert. I prefer my finger to the cup-vibratode. In using these the individual sensibility must be taken into consideration. If a sitting is given with both pneumo and vibratory massage, about two or two and a half minutes should be given to each.

ACTION.

According to Domec: "Pressure exercised upon the flexible cornea is transmitted through the liquids of the ocular media.

The crystalline lens, therefore, shares in the see-saw movements of the cornea. The fibers of the zonule of Zinn are stretched by each pressure brought to bear upon the cornea, and that is so much the more the stronger and more sudden the pressure applied. The series of sittings finally induce a



Fig. 3.—Attachment for pneumo eye and ear massage.

lengthening of the zonule. The action of the ciliary muscle being increased, the power of accommodation is rapidly augmented. At the end of a certain number of massages the fibers of the zonule permanently remain more or less distended, which accounts for the diminution of the hypermetropia.

This theory is plausible only on condition that we accept the hypothesis of Helmholtz with respect to the mechanism of accommodation.

METHOD OF PROCEDURE.

This is how to proceed: The refraction is estimated objectively and subjectively with the greatest care and visual acuity noted with and without correction. The nose and throat are

thoroughly examined and the personal history taken, and any pathological condition found must be corrected if possible. The eyes are submitted to massage for two to five minutes for ten consecutive days, the refraction noted at each sitting, and at the end of the ten massages the refraction is again carefully noted.

I find in many cases the effect of the massage has been so beneficial that no glasses are needed, and in others a weaker

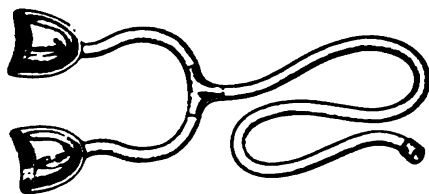


Fig. 4.—Pair of glass eye cups for vibra-massage.

glass than would have been needed before the massage treatment.

HYPERMETROPIA.

In *hypermetropia*, where we have an eyeball with its antero-posterior diameter or axes shorter than normal, causing the principal focus to be behind the retina instead of on the retina, or, in other words, causing parallel rays of light entering the eye during a state of rest to fall upon its retina or fovea before they focus—this condition known ordinarily as far-sightedness—the usual treatment is to place a convex lens before the eye having its principal focus at the far point of such an eye, and of such a strength as to equal the extra amount of accommodation required to neutralize the refraction. If on examination our patient is found to be hypermetropic, we proceed as previously described, and out of 200 cases in children ranging from ten to fifteen years having a hypermetropia of from .50 to 3 D., one hundred of them have been able to go without glasses, fifty of them needed only very weak glasses, and the other fifty required glasses less than one-half the strength of those they originally wore.

In some cases the improvement is immediate, and in others the improvement is not noticed until after the ten sittings.

In forty per cent. of the cases ranging from fifteen to twenty years of age, no glasses were needed, in sixty per cent. of the cases ranging in age from twenty to fifty years, I was able to

reduce the error of refraction and prescribe a weaker glass than would have been required before the treatment.

AMBLYOPIA.

Amblyopia. In cases where one eye is amblyopic, that is, where the eye is blind from disuse due to a deviation of its visual axis, or where the disorder is dependent on disturbance of the circulation,—I massage the amblyopic eye for ten consecutive days; if vision improves after the first day, it is a very good augury. As soon as sight is a little improved, I prescribe glasses which correct the ametropia of the amblyopic eye so that the latter is rendered capable of seeing without the aid of the sound eye. The sound eye is then treated with atropine for some ten days; at the expiration of such time glasses are prescribed correcting the amount of hypermetropia remaining.

I have used this treatment in about twenty-five amblyopic eyes with great success, and it is curious to note how rapidly the sight of the amblyopic eye then improves. An eye previously only useful enough to allow the patient to guide himself by its aid, can, with proper glasses, some application of massage and a little exercise read and suffice for ordinary work.

In case there is squint-hyperphoria, exophoria and esophoria (and statistics show that twenty to seventy per cent. of all squinting eyes are amblyopic) I combine the above treatment with moderate pressure to the spine with the ball on each side of the spine from the occiput to the sixth cervical. I stimulate this region because of the effect on the muscles of the eye. I find the muscles of the eye are supplied by the third cranial, the motor oculi, which also supplies the levator palpebræ superioris, rectus, superior, inferior and internal, and obliquus oculi inferior. The fourth nerve supplies the obliquus oculi superior, and the fifth the external rectus.

According to Snow these nerves are best affected by vibrating their connection with a division of the superior cervical ganglion. The superior cervical ganglion gives off a branch to the middle cervical, opposite the sixth cervical vertebra, which, although opposite the second and third cervical, may be as low as the fifth.

ASTHENOPIA.

By the term asthenopia we mean weakness or fatigue of the eye, applying especially to the retina, the ciliary muscle, the extra-ocular muscles or a general weakness of any one or two, or all of these structures in one and the same eye—this disease is known as “eye strain” or “eye stretching.”

There are three varieties of asthenopia, retinal, muscular, and accommodative; by far the most common one is accommodative. The number of these cases seem to be on the increase. I have tried this treatment with great success in more than one hundred cases. In cases of accommodative asthenopia, massage seems almost an ideal remedy. I have seen such a large number of these cases where all forms of ordinary treatment had failed that massage seems like a panacea. In all cases one should look very carefully into the history special and personal. In female cases a history is often given of uterine affections, and in many others nasal affections will be found. A large majority of these cases are hypermetropic and many present various degrees of astigmatism.

In massaging such eyes it is necessary at times to scarcely touch the eye at first. Greatest care must be used and the patient's confidence gained.

I begin my massage treatment very lightly, following my massage of the eye by applying interrupted vibration with moderate pressure to the spine from the occiput to the sixth cervical—this gives general stimulation to the ocular muscles.

In one hundred of these cases taken from my casebook, massage enabled fifty per cent. of them to go without glasses, in twenty per cent. of the cases the symptoms were relieved by the wearing of glasses weaker than had been worn before, and in some cases the refraction had improved so much that glasses were worn less than one-half the strength previously worn; thirty per cent. of these cases were found to have nasal affections and two per cent. of them were convalescing from acute diseases.

MYOPIA.

In *myopia* the length of the eyeball is greater than that of an emmetropic eyeball, so that the macula lies always posterior to the principal focus of the dioptric system. The rays of light which pass out of the eye from the fovea become con-

vergent and meet at some point inside of infinity. Such an eyeball is too long, its antero-posterior axes are too long and we have the exact opposite of an hypermetropic eye. The parallel rays entering a myopic eye are focused in front of the retina, and by the crossing of these rays in the vitreous and their subsequent divergence, diffusion circles are formed, causing images of objects six meters distant or more to be blurred and indistinct, hence these eyes are usually called near-sighted. The treatment of such cases consists usually of placing the weakest concave lens, which gives best distance vision and which corresponds to the far point, together with reducing the amount of near work, and employing appropriate measures for preventing the disease's progress. I subject these cases to massage, as previously described, and I have been surprised at the results. In more than one hundred and fifty of these cases my casebook shows that in young subjects with slight myopia in forty per cent. the visual acuity without a glass improved to such a point that the glasses became less useful; ten per cent. sight simply improved from one-half to two-thirds of normal or one with the same glasses.

In high myopia seventy per cent. of the cases visual acuity improved. In progressive myopia in sixty per cent. of the cases massage stopped the increase of the myopia.

In some of these cases the increase augments from second to third year, and when we consider that the increase of the defect in the eyes of many of these cases can be prevented, it certainly proves that we are doing more for such cases than simply fitting and changing their glasses.

To apply massage to these cases, it is necessary that the séances be numerous and repeated for two or three months in the course of the year. The explanation of the effects of massage, however, in these cases is not so simple as might appear, since not only emmetropes, but myopes also, find visual acuity raised under its influence. It even happens that in certain myopes the visual acuity augments as the myopia itself augmented.

ASTIGMATISM.

Astigmatism we know is that form of ametropia in which rays from one luminous point do not again unite into one point or focus, on the retina—the defect in the dioptric system, with an irregularity of the radius of curvature of the cornea. For

astigmatism we use cylinders placed at such an axis as to overcome the defect in the curvature.

Continuing my investigations along the same line, I designed and had made for me a spherical eye-cup with a partition on each side of the cup, with the idea of allowing the air to massage any meridian desired, the partitions shutting out the air from the meridian where massage is not needed. I showed this cup before the New England Electro-Therapeutic Association in May. So far my success with the use of this cup has been all I expected, but it has not been in use long enough to state positively just what the results of its use will be. I simply mention it to show that I shall leave no stone unturned in this investigation to secure my desired object.

PRESBYOPIA.

We know presbyopia to be a lessening of power of accommodation that occurs as age advances. It begins after forty years of age and steadily progresses (being most marked in hyperopic persons).

The most prominent symptom is the recession of the near-point beyond the customary reading distance. In presbyopes I have found that by massage about twenty per cent. of these cases may postpone the wearing of glasses.

Since presbyopia is caused by a progressive loss in the elasticity of the crystalline lens, and this loss may be hastened by excessive functional activity of the ciliary muscle, I believe the improvement in these cases is due especially to the mechanical action upon the crystalline lens and its tonic action upon the ciliary muscle.

CONCLUSIONS.

After an exhaustive study of this subject based on a large number of cases, I believe the amelioration of sight by massage may be divided into three groups:

(1) Mechanical action as regards the zonule and the crystalline lens.

(2) Tonic action upon the ciliary muscle and the accommodation.

(3) Trophic action (circulatory, secretory and excretory) upon all the intra-ocular tissues and liquids, ciliary glands, chorio-capillaris, retina, etc.

I have shown a few of these cases before the New England

Electro-Therapeutic Association; in fact, quite a few of my cases have been physicians and their families, some of the physicians being members of this Association and the New England Electro-Therapeutic Association.

My conclusions are—that the persistent elongation of the zonule is so much easier to obtain, the younger the subject, and the less the accommodation has been exercised (amblyopic eye).

That by massage hypermetropia may be considerably diminished. The younger the subject the better the results.

That visual acuity is sometimes so much improved that an eye almost useless from amblyopia ex-anopsia as the result of high hypermetropia, may become serviceable for work.

That some squinting eyes may thus recover sight enough for strabismus, to be cured with the recovery of binocular vision.

That different accommodative asthenopias are also susceptible to great improvement, and many cured.

That some presbyopes may postpone the wearing of glasses.

That some myopes gain notably in distant vision as well as in vision nearby without the short-sight diminishing in any way—that is, the acuteness of vision only improves.

That in progressive myopia in young subjects whose defects yearly augment 3-5 D., we can arrest the increase.

That astigmatism is amenable to treatment by massage once the proper apparatus is perfected.

I believe then from the study of my cases that a large number of persons, especially children now wearing glasses, can by this treatment carried out by an ophthalmic surgeon and an expert be relieved of wearing glasses, and others can be so much benefited that glasses can be worn of from one-third to one-half the strength of those previously worn.

I believe electricity in its various forms to be one of the greatest additions to the therapeutic armamentarium of the ophthalmologist, and in the future must become his greatest ally.

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THE HIGH CANDLE-POWER LAMP: CASE FROM PRACTICE.*

BY S. T. BIRDSALL, M.D., GLENS FALLS, N. Y.

Mrs. B., aged forty years, came under my care in the early part of August, 1907, for chronic cystitis. She had had a similar attack some three years previous which had been overcome after several months of treatment, consisting chiefly of local measures, washing out the bladder with antiseptic solutions, etc. Her present attack followed in the wake of a miscarriage at the second month, during which time she lost large quantities of blood. My treatment at first consisted of washing out the bladder with bichloride solution and employment of the direct vacuum-tube current, using a vacuum electrode introduced into the vagina.

At first some improvement was manifest, but the condition soon assumed one of "statu quo" and the case seemed to be intractable. At this time there were frequent calls to urination, with smarting and burning pains with vesical tenesmus. The urine was ammoniacal and contained muco-purulent matter; about two tablespoonful of the latter being voided in twenty-four hours. At this juncture I put her under the *light treatment*, using a 500-candle power Leucodescent lamp, the light being applied with the parts uncovered, directly over the region of the bladder for about ten minutes. After the very first treatment some relief was experienced from the pain and tenesmus and the frequency of urination. At the end of three days another treatment was given, after which a still more marked improvement was manifest, with a considerable diminution in the amount of muco-purulent matter voided. She came in again at the end of three days and received a third treatment, with instructions to return again after a like period. Ten days elapsed and she had not returned. I called her up on the telephone and asked her why she had not been in for treatment, her answer was, "what for?" Why, I said, the treatment was benefiting you and you ought to continue it. She answered, "I am all right and did not consider it necessary to return; all pain has ceased, the urine is free from deposit and all symptoms have disappeared." After a lapse of eight months there has been no return of the trouble.

* Read at the Eighteenth Annual Meeting of the American Electro-Therapeutic Association in New York, September 19, 1908.

ADVANCED THERAPEUTICS OF ARTHRITIS DEFORMANS—PROGRESSIVE POLYARTICULAR.

BY S. J. WRIGHT, M.D., AKRON, OHIO.

It seems worth while to record the fact that a man, aided by his wife at home, should recover his health after eighteen years of this intractable disease, using only a blue bulb with electric light of fifty-candle power.

Case I. Mr. E. J., aged sixty-seven, is a man of excellent family, good habits, free from hereditary taint, abstemious in diet, and correct in deportment. In 1890, eighteen years ago, first his hands were tender, and later his knees, elbows, wrists, and ankles. Year after year the enlargement increased, and also the tenderness and pain, until the winter of 1906, at which time he was emaciated, anemic, and helpless. His fingers, wrists, elbows, knees, and ankles were deformed. His arm and leg muscles were atrophied until one's thumb and finger could easily encircle either leg above the knee. The thigh muscles were so strongly contracted that the leg was flexed at right angles and the quadriceps extensors pulled the patellæ outward and backwards, dislocating them completely. Such slight knee motion as was possible was attended by a squeaking sound.

He had twenty-two decayed teeth, but lacked courage for their extraction until after six months of radiant treatment by the lamp. Then he had them removed at one sitting under somnoform. His progressive improvement was steady until after two years, or last winter, he was able to walk with a cane and attended to his furnace. He now has normal knees, is ruddy and plump, eats well, sleeps well, and feels well. His ankle joints look well, but are slightly tender, making walking slow. There is a trace of swelling in the left elbow, and his fingers are somewhat enlarged.

He steadily improves and is likely to be entirely cured.

He holds the lamp with its reflector, handle, and extension cords, as near a joint as the heat will permit for fifteen minutes, and so with other joints until an hour elapses. Repeating the treatment at first daily, and later at increasing intervals. He now uses it twice weekly.

Case II. Mrs. N. C., aged forty-eight, had suffered from joint disease for twenty-four years.

In October, 1907, the writer began treatment of the patient, who was then a helpless, deformed cripple, being carried to the office three times weekly. The patient could not then open her mouth. A plate for upper teeth had been imprisoned for many months. Her breath was very offensive. Her perspiration so tainted the bedding that it was necessary to carry it from the house every morning. Anemia was profound, emaciation extreme, and life an intolerable burden. The deformity was visible in her fingers, wrists, elbows, knees, and ankles; while pain and rigidity indicated an invasion of the dorsal vertebræ, especially on the right side. She got little sleep, and that in a half-sitting posture. Her hands were laid on a pillow and needed to be shifted often from side to side. Her feet were laid on a pillow and needed to be shifted often from side to side. She could not touch her head with either hand nor straighten either arm or either leg, nor bear any weight on either foot. A lower bicuspid tooth being absent, she took liquids through the opening.

The treatment consisted of the use of an arc light of several hundred candle power for twenty minutes as near to her body as it could be borne. A blue glass screen was placed between the arc light and the patient. Her wrists and knees were rayed. She inhaled ozone for a half hour. Vibration was used for the constipation and also applied to the joints. Galvanic cataphoresis was also employed at intervals, a sodium chloride solution being applied at the negative pole. A dose of from forty to one hundred and fifty milliamperes was employed for ten minutes.

The ozone removed the odor from her mouth in half an hour and also, after a half dozen sittings, had corrected the odor of the perspiration. Anemia vanished and her appetite and sleep returned. The emaciation is now much diminished. She gains in weight steadily and can now adjust some of her clothing. She can bear all of her weight on her feet, run a sewing machine, do needle work, and suffers no pain. She has been treated ten months and is steadily gaining. Several other cases have been under treatment for a short time with encouraging results.

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ROENTGEN RAY DIAGNOSIS OF THE DISEASES OF BONES AND JOINTS.

BY AMÉDÉE GRANGER, M.D., NEW ORLEANS.

Head of Department of Radiology and Electro-Therapeutics, Charity Hospital; President of Orleans Parish Medical Society; Member of Société Française Electro-Thérapie, Paris, France, etc.

Since the discovery of the x-rays by Roentgen in 1895, and its practical application to the diagnosis of fractures and to the detection of foreign bodies, its field of usefulness as a diagnostic agent has steadily enlarged with the improvements, in apparatus and operating technic. The latest advance, and I believe the most important, is its use as a practical and almost infallible means of diagnosing the diseases of bones and joints.

Without detracting from the value of the x-ray in locating calculi and foreign bodies, in the diagnosis of affections of the thoracic viscera, and as a guide to the proper treatment of fractures, its superior advantage to the surgeon in establishing the diagnosis of the affection and the extent of bone and joint involvement before operation, enabling him to make a prognosis and to select the proper treatment, becomes at once apparent, and of immense importance to the patient.

The details of operative technic when making the x-ray negative have no place in this paper, as we are only concerned with the correct interpretation of the negative. To accomplish this it is essential:

1st. To be familiar with the appearance of skiagrams of normal individuals taken at different ages. Unless the normal shadows are known, it is impossible to detect abnormal ones. This is especially true in the case of children's joints, where mistakes would certainly be made, owing to the fact that ossification does not take place until later in life.

2d. To be familiar with the pathology of bones and joints. This is important, because as will be shown throughout the discussion of the various diseases the abnormal x-ray shadows are always easily accounted for by definite pathological change in the bone or joint.

3d. A correct appreciation of the various shades of the shadow seen on the skiagraph. Always bear in mind the fundamental law which makes those shadows vary in density,

according to the greater or lesser quantity of x-rays which reach the sensitized plate. In composite parts like the human body, those tissues having higher atomic weight or whose structure is more compact, permit less rays to pass through and show a denser shadow on the plate or print than those of lower atomic weight or less compactness in structure.

From the foregoing what follows becomes self-explanatory. The shadows of children's bones are lighter than those of the adult.

New bone formations, callous, cartilage before ossification, throw a shadow which is only slightly more dense than that of the surrounding soft parts, but becomes denser as ossification takes place. In such diseases as rickets, where proper calcification does not take place, tuberculosis, where we find absorption of the lime salts and a rarefying osteitis, the bone shadow becomes paler than normal.

In syphilis, around bone abscesses, the walls of circumscribed osteomyelitis, we find a denser bone shadow, due to bone sclerosis.

Effusion and extravasation cause shadows the density of which depends upon the nature of the effusion or extravasation.

Hemorrhages, producing blood cysts or pigmented areas of extravasated blood, so commonly seen in sarcoma, show as irregular shadows, which are of considerable diagnostic importance.

With these few general remarks I shall pass to the consideration of the individual diseases.

Periostitis. Periostitis can only be distinguished on the radiogram when there is considerable thickening of the periosteum or some exudate existing between it and the bone. It is then recognized as a circumscribed shadow, darker than the normal soft parts. This shadow may be large or small, entirely surround the bone or appear only as a raised dark shadow upon one of the bone surfaces (Fig. 1). If there is secondary involvement or caries of the bone, this will also show plainly in the radiogram. The results of periostitis, the formation of fibrous or osseous tissue between the periosteum and the bone, can also be plainly seen as dark circumscribed areas next the bone.

Osteomyelitis usually affects the shaft of one of the long bones, it may be in close proximity to the joint, but rarely

involves the latter, except secondarily in cases of long standing. It is recognized on the radiogram by the lighter areas of bone and narrow rarefaction, the surrounding darker areas



Fig. 1.—Showing bone shadows as present in periostitis.

of bone condensation and in some cases the presence of sequestra.

The affection causes a softening of the marrow and a suppurative osteitis, which in some cases become circumscribed by a process of osteosclerosis. The periosteum is usually swollen and edematous.

In other cases the medullary cavity becomes involved as the pus accumulates, and the walls of the bones may be broken through permitting the discharge of pus outward, with secondary involvement of the soft parts.

As a result of these changes, necrosis of greater or lesser

portions of the bone may ensue, with the formation of larger or smaller sequestra.

In more malignant cases the entire bone marrow becomes involved. The cancellous tissue of one or both of the epiphyses usually becomes involved and secondary involvement of the joint may result. In young persons the epiphyses very frequently become separated from the diseased shaft by the destruction of the cartilage which binds them together.

Tuberculosis. Recognized on the skiagram by the paler hue of the bone shadow, the atrophy of bone, the epiphyseal preference and, in the later stages of the disease, bone destruction.

Primary tubercular infection of the shaft of bones rarely occurs, except in the phalanges, metacarpal, and metatarsal bones. It occurs most frequently in early life and is often associated with involvement of the joints. The tuberculous process causes a disappearance of the lime salts associated with a rarefying and formative process in the bone. This new tissue formation is simple granulation tissue. Whether in or near a joint, the disease often simulates epiphyseal growth, which shows on the radiograph as enlarged, pale, and squared when compared with the normal size. As the process advances bone destruction takes place, with sometimes the formation of sequestra. The pus cavity may become circumscribed by a process of bone condensation or may invade the joints and soft parts.

Syphilis. Distinguished on the radiogram by the darker hue of bone and the thickened and irregular outline of the periosteal covering, due to the condensing osteitis in and on the surface of the bone and the deposit of new bone under the periosteum. The disease usually commences in the periosteum, which becomes thickened and infiltrated, with or without the formation of bone matter. As the disease progresses, the channels in the bone, enlarged by a rarefying osteitis, forming irregular defects, are filled with new fibrous tissue. The process is not infrequently associated with suppuration and the necrosis of a larger or smaller portion of bone.

Osteo-sarcoma is recognized on the radiogram by a shadow usually paler than that of normal bone and resembling in appearance that of white paint frosted on a pane of glass by means of a piece of absorbent cotton. This appearance is regarded as characteristic by the author. It is due to the fact

that on account of the degenerative changes as well as from the hemorrhagic extravasation, larger or smaller cystic cavities develop and the extravasated blood causes areas of pigmentation. Besides this, in some types of the disease, new bone formation takes place in the mass in the shape of small calcified plates surrounded by a softer zone.

The disease starts in the bone or in the periosteum, and may even start from the outside layers of the periosteum, involving the soft parts, itself remaining intact between the bone and the growth. Most frequently a new bone is formed beneath the periosteum, so that the tumor is encased in a thin bony shell. Perforating this and the periosteum the tumor invades the soft parts, its outline becomes lost and its shadow fades away, blending with that of the soft parts.

In upwards of two-thirds of the cases of sarcoma of the long bone, the growth will be found in one end of the bone, the lower end in the femur and the upper end in the tibia and humerus, probably starting in the epiphyses, *but very rarely invading the joint*, except in the later stages of the disease. In a few cases, especially those of the femur and tibia, it begins in the middle of the shaft, and here it is always of the periosteal type, forming a fusiform enlargement of the shaft in the early stages. Pathological fractures due to this disease are not infrequent (Plates XXII, XXIV).

In one case of sarcoma, in which *the characteristic frosted-like appearance* was not present, operation revealed a cavity walled by a thin shell of bone and filled with a homogenous substance resembling unorganized granulation tissues, which could be easily scooped out. The pathologist's report was giant-cell sarcoma.

This type of sarcoma, the myelogenous or medullary giant cell, is prone to develop cysts in bone and these cysts are often filled with blood and comprise the so-called bone aneurisms. The absence of cystic cavities and pigmentation, the result of degenerative changes and hemorrhagic extravasation and of calcified plates, so generally found in the other types of osteosarcoma, account for the absence of the characteristic appearance mentioned above.

Rickets is recognized by the pale bone shadow, the enlarged medullary canal and the bending of the epiphyses or the shaft, or both, of the long bone.

The condition usually occurs during the first two years of life, but it may be congenital or may occur as late as the twelfth year. Proper calcification does not take place. At the same time, the dilatation of the medullary cavity goes on irregularly and often to an excessive degree. The cartilaginous and sub-periosteal cells grow with increased rapidity and exuberance, and in an irregular manner. As a result the bones do not possess solidity and cannot resist the traction of the muscles or outside pressure. The epiphyses may be displaced or bent, especially in the ribs, less frequently in the long bone. The long bones or the pelvic bones may be in a variety of forms.



CATAPHORIC OPERATIONS AS MODIFIED BY THE TOPOGRAPHIC SITUATION OF PARTICULAR NEOPLASMS, WITH DETAILED REPORT OF CASES.

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(Continued from page 512.)

CHAPTER VIII.

APPLICATIONS TO THE FACE.

The author's experience in the actual employment of electrochemical methods in malignant growths indicates the need of considerable variation in the technique, in accordance with the local situation of the neoplasm, and to a less extent with its variety. A special treatment of the subject from this point of view is therefore necessary, and this special consideration is best emphasized by a full report of some cases illustrating each region, so far as possible.

Basis of Selection of Cases for Illustration.—In selecting these cases, only those that were finally cured will be reported in detail from the first series of cases treated, or those extending from 1893 to 1905, as this series of seventy-nine cases was largely experimental, and many of them would now be rejected as unsuitable for the demonstration of the value of a

novel method; the total number treated in each portion of the body will nevertheless be given. Of the second series, embracing those placed under treatment since January 1, 1905, all will be reported in the order of their admission, special space being given to those having a teaching value.

The classification into "operable" and "inoperable" is based entirely on the apparent operability of a case by the knife and has no reference to its operability by the cataphoric method. Such a classification is modified by the personal equation of the surgeon making it, of course, yet it is of much service in differentiating the curative or merely palliative value of a new method, to which physicians are apt to turn for the relief of desperate cases only, after other methods have been tried and have failed.

APPLICATIONS TO THE FACE.

Epitheliomas of the face are peculiarly well adapted to complete destructive sterilization by zinc-mercury cataphoresis, and when the growth is small it may be destroyed with such delicate limitations of the destructive process to the actually diseased cells, particularly when the minor method is employed, that the resulting scar is less conspicuous than that produced by any other method. This adapts it to the effective destruction of small growths near the eyes, or in situations where unnecessary loss of substance will lead to conspicuous deformity. By repeated employment of from 3 to 5 milliamperes for the regular half-hour durations the malignant tissue alone is destroyed, resulting in a minimal scar, and only such loss of normal tissue as had been actually destroyed by the malignant process. In some cases a pucker at the site of the growth will follow healing if much tissue had been destroyed by the morbid process.

The same reasons that make the minor applications peculiarly valuable in small epitheliomas render them of great service also in early recurrences, particularly of rodent cancer (epitheliomas of the short hair follicles), which, if primarily of small size, may be destroyed by one or more minor applications in the beginning, but in any case, will require careful watching for some months after healing in order that the minute pearls of recurrence on the surface may receive addi-

tional applications from time to time until a final cure has been attained. When the rodent cancer is extensive a major application of 200 to 300 milliamperes should be made at once, with twenty or more fine points attached to a leash of No. 32 wire; but in all cases the minor method will be likely to be needed to complete the cure.

When the growth is close to the eye or ear the importance of turning the current on and off gradually is greater than elsewhere, especially in the minor method without general anesthesia, as harmless but unpleasant flashes or dizziness are sure to accompany a rapid increase or decrease even with a few milliamperes, and a sudden interruption is quite disconcerting. The minor method is nevertheless very effective in cases of slight virulence at the actual margin of the eyelids or in the immediate vicinity of the auditory apparatus. The technique of applications within the orbit will be referred to later.

If the epithelioma be large, a major application is necessary, unless the virulence of the growth is very slight. Since only from 200 to 350 milliamperes is advisable by the monopolar method, large epitheliomas of the face should be destroyed by the bipolar method, as from 500 to 800 milliamperes may be thus used, with great saving of time under the anesthetic and a greater certainty of eradicating the growth.

Epitheliomas of the lips demand a major application under general anesthesia, either bipolar or monopolar, if at all extensive, owing to the exaggerated tenderness of this region and the usual virulence of labial cancer.

Carcinomas and sarcomas of the regions under consideration are often capable of effective treatment by cataphoresis. If deep-seated the facial artery should be ligated before the application to prevent secondary hemorrhage. In these cases search should be made for enlarged glands in the neck, which if found to be still movable, should be raised from their bed by passing a threaded curved needle beneath them, using the thread as a tractive agent to draw them away from the vessels and nerves, passing the active needles beneath them and applying a strong bipolar current with the negative held against the skin over the gland and within the loop of thread. The cataphoric method should not be employed if the infected glands be immovable or deep-seated.

The active electrodes in face cases should be short, to avoid interference with the anesthetizer, light in weight so that they will remain in position, and with sharp points for ready insertion. They should be attached in sets of two or four to No. 30 wire and so anchored by plaster guys to the near-by skin that they will not be dislodged by accidental movements of the patient.

The dispersing electrode, when bipolar, should be about half as large as the surface of the growth, and supplied with absorbent gauze to retain the anion-absorbing acid. In monopolar operations the dispersing pad should be beneath the back.

FIRST SERIES.

NO. 45, PRIVATE CASE BOOK. *Epithelioma of Side and Bridge of Nose, with Metastasis to Neck*.—Mrs. L., aged 84, was referred by Dr. D. F. Woods, of Philadelphia, September 9, 1901. There is an open cancerous ulceration on left side of the nose, eroding the bones of same and a portion of the right side, and opening both nostrils. The erosion extends to the inner commissure of the left eye and threatens to invade the orbit. There is a very large pyramidal swelling on the left side of the neck, below the jaw, which is evidently due to the coalescence of a number of infected glands. The latter growth is immovably fixed in the deep structures of the neck, is the source of more pain to the aged and enfeebled patient than the primary growth, and is absolutely inoperable. The relatives asked simply that the nasal growth be arrested, if possible, before it attacked the eye.

A major monopolar application was therefore made to the primary growth, 200 to 300 millamperes being applied with 6 to 12 fine points for one hour and twenty minutes, under general anesthesia, assisted by Drs. Richard Woods, Hermance, and Okie. The ether was badly borne, and the patient was quite weak for some weeks.

October 12. All sloughs, with some spicules of bone, have separated, leaving a wound with healthy edges. Patient no longer suffers from pain in site of original disease, but has great pain in the metastatic growth in the neck.

The patient died during the following winter from extension of the secondary growth, but there was no sign of recurrence in the nasal region, and the eye was saved.

NO. 50, PRIVATE CASE BOOK. *Carcinoma of Bridge of Nose*.—Mrs. S., aged 68, referred by Dr. Wm. B. Ulrich, of Chester, Pa., December 23, 1901. Six weeks before this date a small pimple had appeared on the right side of the bridge of the nose. It was painless but its rapid growth induced Dr. Ulrich to send the patient to Prof. Duhring, of the University of Pennsylvania, for diagnosis. Dr. Duhring pronounced the growth an epithelioma, and advised its removal by electricity.

A photograph of the growth was taken at this time (Fig. 21), it being about the size of a pea, resting on a raised and



Fig. 21.—Case No. 50 before treatment.

indurated base the size of a penny. The minor method was begun, with very fine zinc-mercury needles and tri-weekly applications of as much current as the patient could easily stand, with cocaine solution at point of insertion—about three to ten milliamperes. It was soon seen, however, that these mild applications were worse than useless, seeming, in fact, to stimulate the growth, which rapidly enlarged. We had evidently to deal with a rapidly growing cancer of a virulent type.

A major monopolar application was therefore made Jan-

uary 16, 1902, 200 ma. being used with fine points for 40 minutes under ether, with the assistance of Drs. Ulrich and Hermance. This resulted in complete destruction of the growth; which was found to involve the nasal bones, the upper surface of which separated spontaneously three months later, leaving a healthy base which healed over nicely. A small opening into the left nostril remained, with healthy edges, but the patient was contented with the cosmetic result without the intervention of a plastic operation, which was advised.

There was no recurrence up to the time of her death from heart disease five years later, in her 74th year.

NO. 51, PRIVATE CASE BOOK. *Epithelioma of the Chin.*—John McW., electrician, aged 56, was referred by Dr. Chas. E. Taylor, of Irwin, Pa., March 3, 1902. Three years ago what appeared to be a pimple on the chin was cut in shaving, after which it grew rapidly. There is a raised, indurated patch on the corner of the chin that is plentifully supplied with tortuous vessels, 3 cm. in breadth, and ulcerated in the center. It is painless. As the patient was compelled to return to Pittsburgh at once, the growth was destroyed by a minor application in the office, sensation being lessened by the injection of a weak cocaine solution into the part. A current of forty milliamperes was used for one hour and twenty-six minutes.

June 14, 1908. Patient returns with a small recurrence in edge of scar. Twenty ma. for one hour and ten minutes.

July 15, 1908. Patient reports by letter that the wound has healed, and that he does not think any disease remains.

NO. 64, PRIVATE CASE BOOK. *Epithelioma of Cheeks.*—Miss S. B. I., aged 44, was referred by Dr. Leonard Judd, of Philadelphia, August 19, 1903. For two years she has had a slowly growing skin tumor on the right cheek beneath the eye. One year ago she was under the care of a prominent dermatologist of this city, who failed to arrest its growth. In June she saw Prof. Duhring, who made a diagnosis of epithelioma. There is a raised, proliferating growth the size of a penny, with indurated base and covered with a crust.

August 19, 1903. Minor application, 20 ma. for 30 minutes.

August 1, 1908. No recurrence to date.

SUMMARY OF FIRST SERIES OF FACE AND SCALP CASES.

OPERABLE CASES.

Without Manifest Evidence of Disease at Latest Report	Ameliorated	Failed	Died Under Treatment
4	1	0	0

INOPERABLE CASES.

Without Manifest Evidence of Disease at Latest Report	Ameliorated	Failed	Died Under Treatment
0	4	0	0

SECOND SERIES.

NO. 28. ONCOLOGIC HOSPITAL. *Rodent Epithelioma of Upper Lip*.—Mrs. H. B. B., aged 73. Admitted to dispensary January 23, 1905. She had had the erosion on the upper



Fig. 22.—Case 28 before treatment, Jan. 23, 1905.



Fig. 23.—Case 28 two years after treatment.

lip, shown in Fig. 22, four years. She received a minor cathaphoric application of 1 to 3 milliamperes for thirty minutes, once a week, for three months, being in feeble health. The second photograph, Fig. 23, was taken October 7, 1905.



Fig. 24.—Case 93 before treatment, March 30, 1905.



Fig. 25.—Case 93; appearance two and one-half years after treatment.

December 3, 1907. Patient reports through daughter-in-law that there is no recurrence.

No. 93. ONCOLOGIC HOSPITAL. *Rodent Epithelioma of Face*.—F. W., aged 55, was admitted to dispensary March 30, 1905, with an ulceration on one side of the nose near eye, shown in Fig. 24. It had appeared two years before, had the characteristic raised edges of a rodent cancer, and was $1\frac{1}{4}$ cm. in diameter. X-ray treatment had been applied by an expert for nine months with temporary benefit and recent increase in size. A minor application of 4 milliamperes was made for a half-hour with two needles, several drops of cocaine solution having been placed on the wound. Two weeks later the scab came off, showing no sign of disease.

November 20, 1905. Patient reports with one small pearl of recurrence. Minor application by Dr. McClary of 2 milliamperes for ten minutes.

December 7, 1907. Reports at dispensary without manifest evidence of disease. The photograph, Fig. 25, was taken at this time.

October 27, 1908. Patient seen at his home. Scar remains exactly as shown in Fig. 25.

No. 133. ONCOLOGIC HOSPITAL. *Epithelioma of Cheek, of Small Size*.—Mrs. J. A., aged 60, admitted to the dispensary May 9, 1905. A scaly elevation, 1 by one-half cm., has been present seven or eight years. X-rays applied in near-by city had no effect. Minor application of 10 ma. for half-hour, two needles. Returned to dispensary by request February 13, 1906, showing no manifest evidence of disease.

No. 140. ONCOLOGIC HOSPITAL. *Rodent Epithelioma of Forehead*.—Mrs. M. C., aged 46, admitted to dispensary May 23, 1905, with several isolated nodules of the disease covering a surface about 4 by 5 cm., recurrent after X-ray treatment. The disease had existed four years, and she had had the x-rays for 9 months. Minor applications of 4 to 5 ma., with 4 needles, have been given on ten different occasions, as the patient returned for treatment, with great improvement. Still under treatment.


(To be Continued.)

Editorial.

A PHYSICAL BASIS FOR MOST CASES OF FUNCTIONAL DISORDER.

THE employment of suggestion, the workings of Christian science healers, and the recent movement of the clergymen of the Christian church in conjunction with members of the medical profession, are indices of the failure of the physician to relieve or cure the so-called functional diseases—a reproach for failure by other methods. The importance of a healthy state of the *ego*, to the extent of a condition of confidence in a particular method, has always been recognized as a factor conducive to the cure of disease; or the improvement of the general status of health under otherwise favorable conditions; but that, under any circumstances, suggestion or Christian healing should be substituted for the regulation of the habits and methods of life, the habits of diet and other habits in the daily routine of the individual or the physical treatment of physical derangements is an absurdity.

A great error is also liable to establish itself in connection with all this institution and discussion of suggestive therapeutics. The great causes of disease are not recognized as they should be by the agitators; but instead, the troubles and cares and anxieties of environment are supposed in too many cases to be the causes of functional disease. If instead of attributing these functional conditions to such causes, it were understood as it should be, that with a man's habits of life in matters of diet, exercise, and regulation against excesses, under proper control, these troubles which affect the mental status, would be borne and carried without creating the physical disabilities which they are too often supposed to induce. A man with a healthy body, and good digestion, and proper habits of life will bear the every-day burdens and cares of life without a physical breakdown. It is a combination of conditions with improper attention to life habits, which leads to an impairment of physical functions; facts that are ignored by the healers who are not trained to understand the importance of the regulation of the balances of the physical economy—enthusiasts who are least able to consider the requirements or demands for the relief of bodily ailments from a scientific point of view.



On the other hand, the medical man who would expect to correct every physical disability by the institution of some medical treatment, without correcting the habits of life of the patient and without taking into consideration, after careful physical examination, the irregularities present in the given case, and employing means to relieve them, occupies no more scientific rôle than the Christian scientist or Christian healer. Undoubtedly nearly all of the physical disabilities and diseases have their origin in physical causes; failure to eliminate which, though the patient may be symptomatically improving, he will never be cured. Any indifferent treatment may suffice for the unthinking and sentimental individual who prefers to live the life of his tastes, eats when, how, and what he likes, not submitting to dictation for proper regulation: whereas the individual who wishes to make the most of life and his environments, has too much sense to ignore the necessity of the regulation of his habits of life. That such individuals fall into the hands of Christian healers, or unscientific practitioners, is unfortunate.

Unless every patient's condition is investigated from the point of view of the habits of diet, with attention to the indications suggested by the presence of a high arterial tension, mental depression, hysteria or neurasthenia and the discovery of the physical origin of the condition, which in most, if not all, cases is certain to exist, the patient's affection will, as a rule, never be entirely relieved.

That a physical basis, resident in some part of the organism, exists as the cause of a functional neurosis, should be patent to the mind of the investigating scientific physician, if he has the means of diagnosis and has learned to trace the relation of physical conditions to functional, nervous, and painful derangements. The physician who does not thoroughly analyze every feature of every case does injustice to his patient, as does the man who does not adopt physical means for the removal of physical defects when other means are ineffective.

* * *

THE THERAPEUTICS OF RADIANT ENERGY.

THE importance of the scope of radiant energy in therapeutics is too often overlooked by the profession at large, as well as by many who employ it with other physical measures.

Too many make use of it in an empirical manner without reference to the various physical and physiological effects upon the tissues; whereas enough is known and demonstrated of the action and properties of radiant light and heat, radium and the Roentgen ray to accord them an important place in rational therapeutics. The employment of radiant light and heat in conditions of impaired metabolism with general application to the trunk or whole of the body, is indicated in a very large class of conditions.

The influence of radiant light and heat upon the peripheral and, to an extent, upon the less superficial structures is such as to awaken general peripheral stimulation with the induction of superficial hyperemia, under which conditions the action of the light upon the blood in the dilated capillaries and arterioles increases the oxidizing power and percentage of hemoglobin, and thereby produces a general effect upon the organism as well as promoting activity of the tissues and glands irradiated. These general effects, together with an increased elimination of perspiration through the sweat glands, are to remove impurities in the form of effete matter and toxins from the system, coincident with the general improvement of tone and metabolism.

When hyperemia is induced in a region of infection, by light or any other agent which stimulates an increased blood supply to the part, without producing stagnation or stasis, the numbers of the leucocytes which bring nutrition into the tissues are increased as well as the phagocytes, which devour the germs infecting the involved region.

Recognizing the significance of these self-evident propositions, it is hard to understand how the value of agents so readily at hand as radiant light and heat, and so universal in their indication and application, are not in more general use by the profession.

Progress in Physical Therapeutics.

PHOTOTHERAPY.

EDITED BY MARGARET A. CLEAVES, M. D.

The Chemical Rays the Motors of Life Energy; their Mode of Action and their Therapeutic Uses. By Margaret A. Cleaves, M.D., New York, Medical Record, September 26, 1908.

The writer, from a long experience in the employment of light rich in the chemical rays, had been led to regard it as an agent of no small import in the many chronic perversions of physiological actions, and emphasizes her confidence in it, "inspired by its known relation to life." She prefaces her remarks by the statement that it is not used by her to the exclusion of all other physical and medical means, and further states that chemical action is not confined to frequencies of short-wave length, any more than chemical action is confined to the frequencies of the red region; nor does she employ the chemical rays of light to the exclusion of the more purely thermal waves of vibration. The purely chemical or cold light is used by the Finsen method; but even so, heating effects are produced. The writer compares the electric arc with a miniature sun, affording more of the chemical energy, as the blue violet, than any other artificial light; but on the other hand, that the incandescent lamps likewise yield blue violet or chemical energy, but not to the same extent as the electric arc. With an increase in candle-power, however, and the employment of larger amperage with incandescent light, the spectral energy in the blue violet is increased. The light of vacuum tubes, energized from any high potential source, is also chemically active. "With the chemical action of light," the writer says, "we are dealing with phenomena analogous to the formation and decomposition of chemical compounds under the influence of the electrical current. . . . That the rays of the spectrum producing the greatest heating effects, are not the rays of the spectrum which produce the greatest chemical effect. The chemical action is best produced by the less penetrating, shorter frequencies. . . . So far as the light frequencies are absorbed, they energize; for absorption means work accomplished. . . . When the waves of light fall upon a growing plant, work is done, and the green leaf absorbs all the frequencies of light except the green, which is reflected. In the light-absorbing sub-

stance a transformation takes place, beautifully shown in the green leaf by the chlorophyll function."

The writer pays tribute to the investigation and deductions of Sajous, and quotes his deductions as follows:

(1) "That adrenoxidase (the oxidases) is the agent through which life may be controlled.

(2) That it is the center of the adrenals in the pituitary body which, through the adrenals and their adrenoxidase-forming secretion, controls life.

(3) That the adrenal center is an organ having for its purpose to test the blood and protect it against the intrusion of noxious substances.

(4) That noxious substances introduced into the blood can, by provoking a reaction of the adrenal center, enhance the activity of metabolic processes.

(5) That inasmuch as we can therapeutically (all drugs being toxic as far as the test organ is concerned) increase or abate fever, we can also control tissue metabolism and its derangements.

(6) The test organ is, therefore, to be regarded as a keyboard through which we can 'favor or retard the action of the oxidases,' *i. e.*, the vital process itself."

The writer closes her paper with the consideration and conclusions as follows:

"Résumé: (1) The chemical frequencies of light are the promoters of life and energy.

(2) Thermal are never used to the exclusion of chemical frequencies in light therapy.

(3) Chemical frequencies are directive or destructive according as they are used. Especially is this true of the irregular, disorderly impulse of the x-ray as compared with the rhythmic energy of the visible spectrum.

(4) The x-ray and radium radiations are of great value in many skin conditions, even superficial epitheliomas, in some instances mitigating the symptoms and staying the progress of deep-seated malignant processes as well. They are, however, on the other hand, capable of exciting malignancy and inhibiting physiological function.

(5) Bactericidal energy has been located by experiment in the middle third of the ultra-violet energy.

(6) The best results are obtained in deep-seated well-organized skin lesions by a complex of the penetrant blue-violet and ultra-violet.

(7) Where profound sudation is desired over and above penetrating effects, a source of light affording thermal with a minimum of chemical energy is indicated.

(8) When deep-seated effects are desired, sources of light rich in blue, indigo and violet are indicated.

(9) The spectra of the different sources of energy vary in degree, not kind; hence the interlocking of effect secured and result established from the various light sources.

(10) When the office equipment affords but one light-mechanism, preference is yielded the electric arc as providing the maxima of energy required in initiating and establishing necessary physiological processes, whether the departure from the normal is characterized by a skin expression or not.

(11) More or less profound hyperemia is established as a result of the use of light, depending upon its length of application and the degree of penetrating power. Upon this depends the rationale of its action.

(12) The physiological action of the chemical ray is fundamental to nutrition.

(13) The chemical rays are an invaluable therapeutic adjunct in the host of chronic conditions characterized by loss of chemical control; they lend themselves to conditions of malnutrition or perversions of nutrition, to both simple and secondary anemias, controlling hemorrhagic conditions associated with the latter, as uterine and rectal, for example. They are almost a specific in the annulment of pain, relieving for a time even that from pressure of malignant growths, quieting and steadying nerve action in simple nervousness, storing up energy for the neurasthenic, establishing more or less hyperemia in organic cord conditions and to that extent holding and preventing extension of the disease, contributing alike to the relief of a simple depression or excitability and to a maniac-depressive insanity. They are likewise effectual in absorbing effusions from serous cavities and subcutaneous structures, whether secondary to malignant processes, and inflammation, a leaky heart or a hydrocephalic effusion associated with rachitis. They also prevent and cut short the progress of ineffective processes, and cure or improve the many skin expressions of disturbed metabolism. Equally they may arrest and control respiratory disturbances, from a simple catarrhal cold to a bronchial asthma or a pulmonary tuberculosis. They are in short an agent of infinite value, either alone or supplementary to other measures when intelligently directed and skilfully applied. In an office affording every luxury of equipment, I feel that of physical measures the constant current and electric arc contribute very largely to the securing of therapeutic result."

[EDITOR.]

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

Early Treatment of Some Superficial Cancers, Especially Epitheliomas, by Pure Radium Bromide Rather than Operation or X-rays. By Francis H. Williams, M.D., Journal A. M. A., September 12, 1908.

This excellent paper devoted to this interesting subject is one well worth reading. The writer goes into the history of the subject, largely from his own experience during the last eight years, and certainly presents some very nice statistics. He believes that there should be at least 50 mgs. in one capsule for use and that the smaller conditions only should be treated with radium, that the larger surfaces are more readily reached with the x-ray. He says the rays from radium issue spontaneously and continuously and are uniform as to quantity and quality, so that it is possible to give an exact dosage, which he considers very different from the x-rays. It is not his intention in the paper to show that treatments by the x-ray, operation, or caustics are obsolete, but to suggest that radium may be advantageously used instead. In applying the radium the capsule, containing 50 mgs. of pure salt at the end of a handle a foot or more long, should be held over each area to be exposed for a period varying from one-half to three, and sometimes four, minutes. With this amount the exposure should be made from one to three times per week, and less often after healing has begun. For the sake of cleanliness he covers the capsule with a rubber cot. Among other cases reported are 69 epitheliomas, which are divided as to sites of the disease as follows:

	Total	Healed	Not Healed	Under Treatment	Stopped Treatment
Lower lip	14	11	..	1	2
Lid	9	6	..	1	2
Auditory canal	1	1	0	0	0
Face	24	20	1	1	2
Ear	1	0	0	0	1
Hand	1	1	0	0	0
Nose	19	17	0	1	1

These statistics are very encouraging.

CONCLUSIONS.

(1) The radiations from radium are uniform in quality and quantity, and thus this remedy has a great advantage over the x-ray in efficiency and safety.

(2) The gamma rays from radium are useful in some cases for relieving pain. They have great penetrating power. When

they are used as analgesic the beta rays should be excluded or the patient may be burned; because the proportion of gamma rays is so much smaller than that of beta rays that the exposures must be much longer when the gamma rays are used to make them effective.

(3) The beta rays from radium are the useful rays in the treatment of rodent ulcers, epitheliomas and other superficial diseases. They can be applied in the mouth and other cavities.

(4) Radium should be used early and in suitable amount and strength. The treatment is painless and leaves the least scar.

(5) Radium does not produce as good results in cases in which an operation has first been done or scraping, caustic or other irritating treatment has been used, or the x-ray has been applied.

(6) Improvement follows the use of radium more promptly in many cases than in the use of x-rays, and the total duration of treatment by radium, though sometimes long, is much shorter than with the x-rays. In some cases success has followed the use of radium where treatment by the x-rays has failed.

(7) A surprisingly large portion of external cancers, especially epitheliomas, have healed and remained healed for some years under treatment by radium, and my experience thus far indicates that for certain cases of external new growth it is a better remedy than those previously at our command.

(8) Recurrences follow all methods of treatment and radium is no exception, but so far as present experience goes this is unusual, and they have yielded to further treatment by radium.

(9) The disadvantage of radium is its cost to the physician.

Diagnosis of Pulmonary Tuberculosis by X-ray. N. Y. M. Journal, October 3, 1908.

Leonard states that recent improvement in apparatus and technic have so added to the value of the Roentgen rays, that in diagnosis of pulmonary tuberculosis with instantaneous exposures it is possible to detect bronchial glands and areas of infiltration about the roots of the lungs, where neither percussion or auscultation can reach them, and before the bacteriological test has determined their etiology, and at the stage when only the symptoms complex suggests tubercular disease. In addition, in the increased detail it secures, by the elimination of motion due to the heart's pulsation, and involuntary movements during suspended respiration, it furnishes a more precise registration of the affected areas. It also shows cavities and areas of softening which lie too deep to be detected by ordinary clinical means.

DERMATOLOGY.

EDITED BY HERBERT F. PITCHER, M. D.

Pruritus Ani, Its Cause and Treatment, with Special Reference to the Use of the Roentgen Ray. By R. D. Mason, M.D., Omaha, Neb., New York Medical Journal.

As the writer observes, it is the most intractable disease that the rectal surgeon is called upon to treat. For after hemorrhoids, ulcer, fistulæ, rectal catarrh, and pin-worms, are removed the itching continues. The skin becomes thickened and parchment-like and the nerve endings seem to be pressed upon and irritated. The patients seldom consult a physician until the trouble has become chronic. "It is named by the patient 'itching piles,' and his whole thought is how to get rid of the intolerable itching, which is wearing his life out."

The skin about the anal margin is thrown into folds or ridges, and looks unnaturally sodden and dead; also in most cases there will be seen an unusual amount of moisture coming from the bowel. An eczema is generally present, often extending over a large area, which is very hard to heal, and does not respond to the usual remedies.

In the treatment the most important thing is to find the exciting cause and remove it. Where the skin is thickened and rough the author uses a 95 per cent. sol. carbolic acid, or a sat. sol. of nit. silver. The epidermis pulls off in a few days, leaving a somewhat tender surface that should be treated with soothing ointments. After an interval of two or three weeks the acid should be applied again. This may have to be put on several times before the skin becomes natural. In cases that are caused by vegetable parasites the author uses the pure sulphurous acid with good results. One application is usually enough.

The author believes that most of these cases are due to a catarrhal condition of the bowel which, if seen early enough, treatment carefully carried out would cure the pruritus. He mentions many other causes, such as diabetes, rheumatism, and gout, as these patients are usually affected with eczema. Certain errors of digestion as well as certain articles of food may start an attack of pruritus, such as coffee. All of these things should be carefully searched for and given careful attention.

The author absolutely refuses to treat a person who is in the habit of drinking any form of alcohol. As a rule the treatment is long and tedious and the patient must make every effort to assist in bringing about a cure.

He mentions many formulæ which he has used with more or less success, but owing to the difficulty experienced in effecting a cure in some of the chronic cases which came to him for treatment, he was led to try the Roentgen rays. This method is only

useful in old, chronic cases, where the skin is eczematous and thickened. Just what the action is that causes the eczema to disappear and the skin to return to its normal condition the author is unable to say, but that it does so is beyond question.

His technique is as follows: A soft tube is used, with an exposure of ten minutes' duration twice a week, until it is learned how the skin is going to stand it. If there is no irritation three treatments are given a week, until a brown discoloration appears. All treatment is then stopped until this goes away, when treatment is resumed until it reappears. This is usually enough, but if possible, he thinks it is well to give an occasional treatment after this as a matter of precaution.

The author hopes to make further reports of the use of the Roentgen ray in the near future, after there has been more time to test its merits.

SOCIETY MEETINGS.

AMERICAN ELECTRO-THERAPEUTIC ASSOCIATION.

EIGHTEENTH ANNUAL MEETING.

September 22, 23, and 24, 1908.

First day, Tuesday, September, 22, 1908.

The eighteenth annual meeting was called to order by the president at 10:30 A.M. in the Engineering Societies' Building, 23-33 West Thirty-ninth Street, New York City.

Report of the Executive Council.—The secretary, Dr. Albert C. Geyser, said that the Council had met on four different occasions during the year and had transacted the usual business that had come before it. He announced the resignation of six members. One member had died since the last meeting.

Election of Fellows.—The secretary announced the names of Fellows who had been elected by the Council, as follows:

New members elected at the annual meeting, September 22-24, were as follows: Dr. Victor O. Robertson, Brooklyn, N. Y.; Dr. William N. Barnes, Springfield, N. J.; Dr. John S. Yates, Paterson, N. J.; Dr. Walter James Clarke, New York City; Dr. Francis A. Rutherford, Grand Rapids, Mich.; Dr. Henry C. Sherer, Norwalk, Conn.; Dr. Lucy Osborne Wight, New York City, Dr. John Thelberg, New York City; Dr. David Ralph Bowen, Rome, N. Y.; Dr. Leopold Jaches, New York City; Dr. Noble Murray Eberhart, Chicago, Ill.; Dr. Mary Alice Brosius, Washington, D. C.; Dr. Charles J. Walsh, Cam-

bridge, Mass.; Dr. Burt Nichols Bridgman, Boston, Mass.; Dr. Herbert McIntosh, Boston, Mass.; Dr. William James Dugan, Philadelphia, Pa.; Dr. Wright B. Bean, Rockville, Conn.; Dr. Victor Evelyn Collins, Honolulu, T. H.; Dr. Louis R. Kaufman, New York City; Dr. A. A. Haig, Saumville, Suffolk Co., Mass.; Dr. P. H. Shaw, Binghamton, N. Y.; Dr. E. M. Sala, Rock Island, Ill.; Dr. W. G. Alling, New Haven, Conn.; Dr. Frederick William Derby, Arlington, Mass.; Dr. John Forrest Valentine, Danvers, Mass.; Dr. Oliver P. Penning, Baltimore, Md.; Dr. Fred C. Newcomb, Mantua, O.; Dr. Daniel D. Talley, Jr., Richmond, Va.; Dr. Edgar Birdsall, Glens Falls, N. Y.; Dr. Albert S. Munson, De Land, Fla.; Dr. William F. Marks, Reading, Pa.; Dr. William A. Shufelt, New York City; Dr. Cornelia C. Brant, Brooklyn, N. Y.; Dr. Charles B. Tefft, Utica, N. Y.; Dr. George Starr White, Yonkers, N. Y.; Dr. Franklin Patterson, Sioux Falls, S. D.; Dr. C. Nelson Raymond, New Rochelle, N. Y.; Dr. Julius Weiss, New York City; Dr. E. R. Osterhout, Ithaca, N. Y.

Associate members: Dr. R. E. Farmer, New York City; E. W. Locke, Chicago, Ill.

Report of the Committee of Arrangements.—Dr. E. C. Titus of New York said that the Committee had been exerting itself modestly and was prepared to give the following report: They had secured this new building for the meeting. A programme had been prepared and is now presented. For Tuesday there has been arranged a morning's session and afternoon session, and a night session. On the two following days morning and afternoon sessions. The Committee would be glad to give any information in its power about the Association or the work they were doing.

It was moved and seconded that the report be received, approved, and placed on file.

Unfinished and miscellaneous business.—Dr. Brinkmann moved that a membership card be issued to each member of the American Electro-Therapeutic Association upon the payment of his dues. Seconded and carried.

Resolutions and notices of motions.—The secretary announced that the Executive Council had taken into consideration the resolution of Dr. Werber and had reported adversely. On motion to adopt the proposed amendment, it was lost.

President's address.—Dr. Pitcher then read this address:

"The Advancement of the American Electro-Therapeutic Association."

Dr. Dickson moved that the propositions contained in the President's address be referred to the Executive Council and that it be asked to take immediate action upon the recommendations and report back to the Association at this meeting.

Dr. Snow seconded the motion.

Dr. Brinkmann believed that they should all feel very grateful to the President for the stimulus conveyed in such beautiful thoughts, which were expressed so well. The President thought quietly about the work of the Association and for its betterment. He hoped that what had been said would sink deeply, for there were in the thoughts expressed so admirably suggestions which meant much for the success of the Association, especially for the scientific side of electro-therapy. Motion. Carried.

REPORT OF THE SPECIAL COMMITTEES ON MODALITIES.

On Induction Coils and Alternators.—Dr. Brinkmann, chairman, made the following report:

Your committee desires to call attention to those features in transforming devices which are of prime importance in determining the efficiency of all apparatus for producing inductive changes in quantity and potential where solenoids, electric or electro-magnetic fields exist, whether in the smaller apparatus such as the faradic or the larger ones, as used for x-ray, high-potential, D'Arsonval, or Oudin currents.

The relationships for inductive performance being practically computable from the proportions of windings, resistances and carrying capacity of the several members. Since these matters are purely mathematical, the constructor is merely compelled to adhere to the predetermined data in order to secure definite results, exercising the care in structural details expected from all good mechanicians.

The interrupting devices, however, are of very great importance, since the regularity, speed, and character of contacts depend upon the design and execution of what we may consider as the governor of the apparatus. The duty quantitatively in the smaller apparatus being lighter, the question here is one of refined, selected, and uniform interruption rate. Durability and facility of necessary renewals being always considered. The old type of ordinary spring-interrupters is practically excluded in the light of our present knowledge, for therapeutic work with faradism, since no variation of importance is possible. Further, the fact that but a single rate can be employed at a time.

The work of Engelman with rotary-interrupters for the development of variable pitches is of very great importance. Your chairman will, during the coming year, study this form of current, so that the limitation of rate as associated with analgesia and anesthesia will become known to us, as generated

by this type of interrupter. The further development of this apparatus, or modifications of it, will, it is predicted, become exceedingly important in practical therapeutic work.

Recent exploitations of a form of interrupted direct-current for purposes of anesthesia, while important in connection with our general studies of currents and apparatus, are not in any sense new or unknown. Reference to the transactions of the society of two and three years ago will confirm this statement.

In the field of high potential-induction apparatus of the coil type, the interrupter again assumes a position of very great importance. In the annual report of your Committee for the year 1906 can be found an outline of the requirements for properly judging and estimating interrupters.

During the past year a type of interrupter has come into the forefront which practically embodies the valuable features completely outlined in the above-mentioned report. This device is a magnetic interrupter with large contact areas, capable of close speed adjustment, with the added advantage of condenser for using the inverse load. The particular points of advantage are (1) adjustment for rate, (2) cleanliness, (3) durability, (4) economy of current consumption, (5) the ability to use the coil persistently for hours at a time, (6) the avoidance of any danger of explosion, (7) the absence of all fumes of a noxious or corrosive character, (8) great compactness, (9) absolute reliability on either direct or alternating current.

The windings of the primary must necessarily be suitable for this type of interrupter, but since all of the modern coils have an adjustable and removable primary this adjustment can be quickly and economically made.

Your Committee again urges the importance of recording upon each coil its structural data. The number of turns of both primary and secondary, the lengths of wire, the gauges of wire, also the ohmic resistance. The use of meters in circuit with the primary will approximate the character of the output under varying conditions. No satisfactory meter for the measurement of secondary currents exists commercially.

In the matter of Sinusoidal apparatus, nothing new of importance has been recently developed.

The physiological action of the alternating currents within the therapeutic bounds has been reviewed in several papers by the chairman of this committee, and will be found in the proceedings of the society.

The following is a summary of the classification:

Faradic—

Low voltage and high quantity—chemism and heat predominant with muscular action.

High voltage and low quantity—action depends on rate of interruptions.

Single Pitch—

High pitch; sedative, analgesic, anesthetic, inhibitory.

Medium pitch; stimulating, muscular contraction, gland stimulation.

Low pitch; stimulation more marked than in medium, muscular tetanization.

Multiple Pitches—

Harmonic; same as in single, but more intense.

Inharmonic; stimulant and irritant quantities predominating.

Surging; varying muscle action, similar to changes in rate.

Interrupted; varying muscle action, similar to changes in rate.

The two latter are the most stimulating forms.

The sinusoidal current will act similarly to the classification for the faradic—under the appropriate heading—for speed of changes, pressure, and quantity; of course this is always a single rate.

D'Arsonval and Oudin—

(1) Disruptive:

Long-continued in high quantity; destroys tissue. (Hart).

Briefly applied; for securing graduated reactions in tissues; powerfully stimulant. (Brinkmann).

(2) Convective. For securing metabolic and heating effects.

(3) Induction method—solenoids, induction couch—metabolic, alterative, heating-sedation.

(4) Effleuve. Sedative or stimulant, depending on technique.

Dr. Snow moved that the report be received and placed on file. Seconded, and carried.

Report of the Committee on Meters. Walter H. White, M.D., chairman.

Your committee begs to report that no new device has been submitted to it for consideration. We feel that the Association has fallen off in its interest in good reliable meters since the report of an actual testing of many meters by our lamented member, Professor Herdman, who showed that the meters manufactured at that time varied from 10 per cent to 100 per cent. The use of meters shows us the amount and energy employed, and they should be reliable.

The "wave meter" measures for us the *frequency* when we wish to purchase a high-frequency machine, and settles the question of how high is the frequency. So that any manufacturer having a really good machine need not be afraid to demonstrate the same in competition with others who make possible larger claims for their apparatus. This meter, while costing \$75, would help the physician to judge what machine was really of high frequency, as against those of only low frequency. This style of meter is used by the Government

in measuring wave lengths in wireless telegraphy. Messrs. Clapp, Eastman & Co. are experimenting with a hot-wire meter to measure high and low frequency, to be sold for \$25 or \$30. The Stanley meter, now made by the General Electric Co., are designed for commercial use.

The Wappler is a good instrument but the scale for reading is bad, not being easy to read as compared with others. The Dudell meter is an English instrument too delicate for physicians' use, and the cost (\$150) is too high. The Whitney hot-wire instrument, and another made in Cambridge, Mass., both sell for \$30, and are fairly reliable.

For x-ray coils the Weston meter, measuring 0 to 25 ma., costs \$25. For direct-current measurement the Weston ma. and volt meters are the standard for accuracy.

Respectfully submitted.

Dr. Snow moved that the report be accepted and placed on file. Seconded, and carried.

Report of Committee on Phoresis. Charles R. Dickson, M.D., chairman.

Your Committee on Phoresis begs to submit the following report:

Dr. Marcus F. Wheatland reports that he knows of nothing especially new in reference to phoresis, but thinks that attention should be called to the advantage of the use of a twenty per cent. solution of Churchill's Tincture of Iodine at the negative pole, instead of the ordinary use of plain water or bicarbonate of soda, in moistening the cotton-covered electrode which is generally used in the absorption of pelvic exudates.

The negative pole applied against the diseased area attracts thereto the alkalies, with their softening and disintegrating effects. The iodine being electro-negative is simultaneously driven off from the negative pole, enters the tissues and combines at the end of the treatment with the alkalies, thereby increasing their absorbent effects, producing more rapid absorption of the exudates than otherwise.

He has likewise found the use of Churchill's Tincture of Iodine, full strength, very beneficial in simple endometritis (uncomplicated by pus tubes) used upon an electrode such as he described some years ago, with a syringe attachment, so that the cotton surrounding the active portion of the electrode could be saturated with the desired medicament after introduction into the uterus. It is absolutely safe. Many seem to be afraid of it on account of the dread of forcing fluid into the fallopian tubes, which is absolutely impossible, for when the fluid is forced out of the syringe it readily finds its way into the vagina by capillary attraction along the fibers of cotton.

Dr. Wheatland has noted the reports of the work done by LeDuc in absorbing the thickenings of anchylosed joints, and

of Lewis Jones in the use of twenty per cent. solution of magnesium sulphate at the anode for warts, but has had no personal experience with either method.

Dr. Marcellus Reeves has nothing to offer as a member of the Committee, not having done much in the line of phoresis for some time.

Your chairman has to plead guilty to the same charge, and for the same reasons, but his assistant in the Department of Electricity at Toronto General Hospital, Dr. George Balmer, has been carrying on some experiments in phoresis at the hospital during this year, and the results may be briefly summarized.

In a patient aged forty years, with tabetic blindness of one and a half years' duration and absolute, the constant current employed for six months produced no effects. Phoresis with cypridol—a preparation of mercuric chloride in oil—at the positive pole 10-15 ma. for 10 m. twice or thrice weekly has been employed for one month. The patient can now detect the brightest part of a room. The positive pole is placed over the closed eyelids. No blistering has occurred.

In a case of tabes with *tic douloureux*, a man of sixty years, phoresis with weak solutions of soda salicylate 15-20 ma. for 10 m. produced good results. After the first treatment he had only one attack and it was not as severe as usual.

In tuberculosis of the knee-joint with amputation and tubercular process in stump, phoresis with a saturated solution of iodoform did no good. A solution of thymol and creosote dissolved in alcohol and added to water to make a weak solution produced exceedingly good results. Granulations disappeared and healing is continuing.

All of which is respectfully submitted.

Discussion.

Dr. Massey said that calling attention to two cases of goitre occurring in young girls, which were treated by anaphoresis, might not be out of place. Apropos of the subject under discussion he suggested that the name be changed to medical phoresis; this included cataphoresis and anaphoresis. He said that Dr. Dickson had read a number of papers on the value of the constant current in enlargements of the thyroid gland other than cystic. While it was not his experience to get such good results in that condition occurring in adults, he could report two instances occurring in young girls in which the goitres disappeared following the use of the negative pole in iodine solution, about thirty milliamperes being applied for fifteen minutes three times a week. One girl was sixteen, the other seventeen years of age. The development in the size of the gland was somewhat rapid, noticeable in from six weeks

to two months' time. The technique employed had but one little variation. He prepared the solution by taking a solution of iodide of potassium well above saturation, not using it too strong, so as not to produce skin irritation. Into that he dropped a few drops of tincture of iodine until he obtained a slight color. That really formed a Lugol's solution of iodine. This was used at the negative pole and placed on the goitre, while the positive pole, surrounded by clay pads, was placed under the patient's back. This little kink about the active or negative pole he considered worth mentioning. It was readily made for each patient. It was best made from thin x-ray metal, cut in saddle-shapes, and applied on each side of the goitre. It stuck out on each side and might be punched full of holes. This x-ray metal could be readily pierced, and so the nurse could sew it. Eight layers of gauze were used. These were wet with the solution and fastened to the patient with sticking plaster. This was merely to hold it motionless during the fifteen minutes' treatment. It should be kept wet. He said that after all this was merely a matter of details.

Dr. Snow asked if the improvement might not have been caused by the action of the continuous current, as many early cases are cured by the static-wave current. He thought it superfluous to employ the drug without demonstrating its necessity.

Dr. Massey replied that it was his impression that the iodine was a valuable addition.

It was moved and seconded that the report be received and placed on file. Carried.

Committee on Static Currents. William Benham Snow, Chairman.

Mr. President and Fellow Members of the Association: In accordance with the resolution passed at the last meeting of the American Electro-Therapeutic Association, in conference with my committee, I have prepared the following report as chairman of the Committee on Static Electricity

The degree of success to be obtained from this powerful agent must depend very largely upon the operator's knowledge of its basic principles of action and methods of employment.

The mystery of empiricism which has for centuries surrounded the medical uses of electricity can no longer cover with superstition the action and effects of *this* form of electrical energy. Its actions, largely mechanical, are certain and well-defined, and its therapeutic indications are recognized and well established by those who have ceased to be mystified, and have become rational in its employment. With them it is far more than a measure for suggestion in therapeutics.

Physical properties.—Upon the peculiar physical properties of the static form of electricity, properties which never have

been and are not likely to be duplicated, many unique and valuable effects depend.

In a properly-efficient apparatus, the opposite polarities of great potential, each seeks the other with greater energy if it has not been passed through a coil, when it loses to a degree its unipolar characteristics. This is peculiarly well illustrated by the effects of marked contraction induced by the current derived from one side of a Holtz machine, the other side of which is grounded and interrupted by a discharging spark-gap employing a glass vacuum tube, a metal, or a well-saturated covered electrode. After this current passes through the coil of a static resonator, or so-called high-frequency apparatus, this distinctive character of intense contraction is damped out or lost with the departure of the otherwise unipolar quality of the current.

The extent or degree to which contraction can be produced—the distinctive, diffused, painless, contraction of the static current, when employing the modern static machines, is remarkable. It will affect the largest and most deeply situated muscles of the human frame, particularly so when metal instead of glass electrodes are employed over the parts.

This contraction is absolutely painless, except when involving inflamed tissue or when a potential, measured by the length of the spark-gap, is employed long enough to make the contraction severely tonic. This effect, as stated, is substantially peculiar to the currents of the static machine. This mechanical feature of the static discharges is strikingly characteristic of them; not that other currents do not produce contraction, but that their quality varies in being less potent, more painful, and less diffusive, other things being equal.

The currents of the static machine have also, as previously stated, a distinctive unipolar quality most marked when produced under relatively low rates of speed.

Poor insulation and internal conditions in the case, particularly as to moisture upon the stationary plates, if discs, particularly in Holtz machines, not provided with divided stationary plates, leads also to inverse or alternating current effects. The ideal conditions for unipolar effects from the static machine are (1) slow speed, (2) dryness in the case, and (3) divided stationary plates.

The remarkable diffusibility of the static current is particularly noticeable when one side of the machine is *grounded* and the other connected to an insulated object or capacity. This is probably due (1) to the distinctly opposite unipolar charge of surrounding insulated capacities—an object or patient on the insulated platform and the surrounding walls of the room and other objects in the room, (2) to the mechanical features, so remarkably unique, of the current of the static machine, and (3) to the very great potential or voltage of the current. Cur-

rents from no other source possess these qualities to the same extent, other things being equal. This quality of *diffusion* is one of the characteristics of greatest value in therapeutics. All who are at all familiar with static electricity have noted this wonderful contrast in diffusion when in the electrical field of other apparatus of equal volt capacity. No current from other source runs away to an equal extent through the air, over a wooden conductor, or is insulated with such difficulty as the static current. The contrast is striking.

Condensation, that property by which the charge accumulates about the surface of insulated bodies or capacities, is most marked in the static charge, the great stress or tension of the current being remarkably manifest in the upright and divergent position of the hairs on the patient's head. How different the performances of equal potentials from other sources under likewise similar conditions.

These contrasts are made in order to better illustrate the distinctive qualities in inducing painless muscular contraction—*diffusibility, distinct unipolarity, and mechanical properties.*

Physical effects.—When we come to consider the effects of the static modalities upon the human organism many questions arise, some of which have been often controverted by superficial observers, who have little or no knowledge of the physical laws which govern electrical phenomena or have failed to fully recognize their *modus operandi* upon animal tissue.

The course taken by these currents under the varying conditions of different arrangements or connection is one concerning which many misconceptions have prevailed, leading to all sorts of erroneous ideas as to the effects of the various static modalities or methods of application.

Graphic drawings are here shown, which have been made in order to better convey a correct impression of the general course taken by the currents. These may serve to make more clear the explanation that the static currents do actually pass through the tissues, and not over the surface, as has been so often erroneously stated.

The static charge, known also as static insulation, is administered to the patient in position upon the insulated platform, which is connected by a metallic rod or chain to one side of the static machine. The effects are remarkably intensified by grounding the opposite side by a metallic connection to moist earth. The same intensification of the effect of grounding is true of all other static modalities which are administered to the patient insulated.

With the Shepard's crook or other conductor connecting the insulated platform to the ungrounded side of the static machine, the patient sitting or standing at sufficient distance from the end of the rod on the platform, that a spark will not pass

from the metal conductor to the patient, the current will pass over the wood to the feet, and thence surround the patient's person. How does the current pass to surround the surface? This seems to be a mooted question in the minds of members of our profession, who seem to have assumed that it passes over the surface to surround the body of the patient.

When we realize that the skin, which is well known to be a poor conductor, offers great resistance to electricity, on the

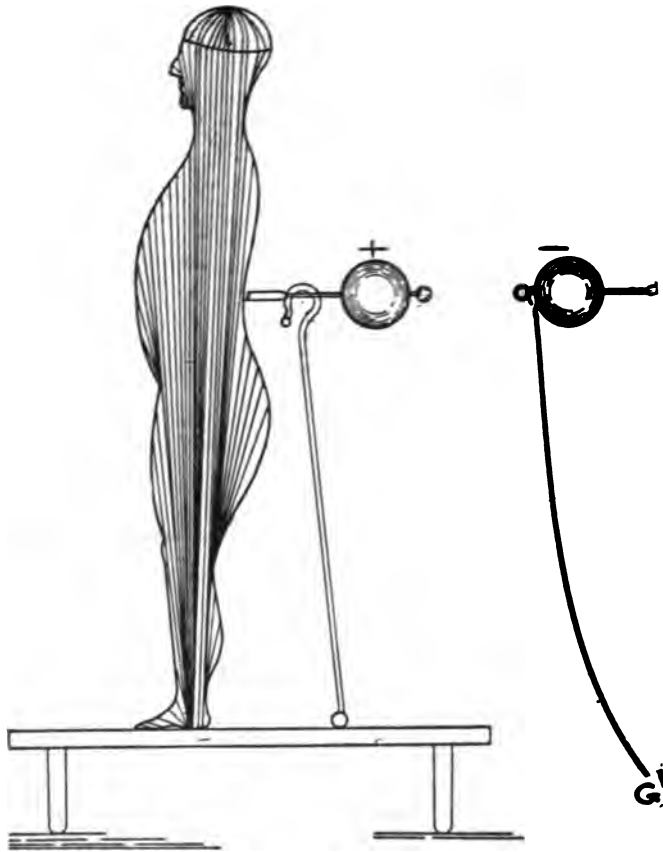


Fig. 1.—Showing the general direction which the current takes in section during the administration of the Static Charge or Static Insulation.

average one hundred times greater resistance than the moist tissues beneath, which are practically a homogenous normal salt solution—an excellent conductor—it is impossible to sup-

pose that the current would be more likely to pass over five feet or more of the dry skin than once through it, and then in lines of least resistance, by the shortest path to the surface of every part, fulfilling a law which can never be violated. As well assume that the continuous current (galvanic) passes

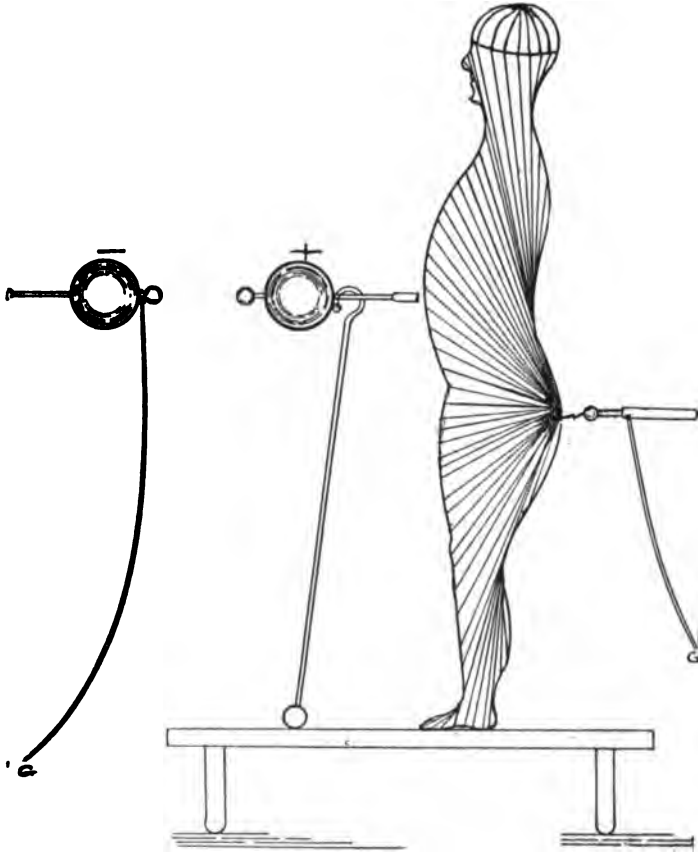


Fig. 2.—Showing the general direction which the current takes in section from the surface to the point of discharge in the administration of the Static Spark.

over the insulation of the connecting cord instead of over the wire beneath it. The accompanying drawing (Fig. 1) illustrates in a general way in cross section the passage of the current to the insulated platform, and thence to the surface of the body of the patient, showing approximately the path in one plane from the feet during the administration of the static insulation.

The discharge of a static spark from the body in a state of charge is illustrated in Figure 2, showing the focusing of the electrical lines of positive charge to the point of escape, where it passes through the dielectric, the air, to the grounded metallic ball electrode. In this event, when the current passes con-

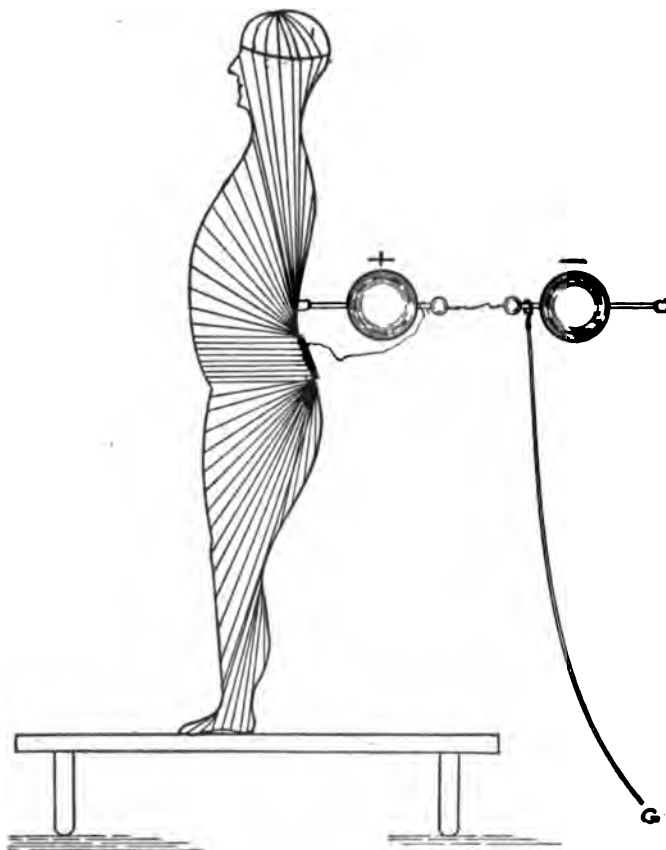


Fig. 3.—Showing the general direction which the current takes to and fro from the surface to the metal plate during the administration of the Static Wave Current.

stantly from the machine, charging the patient, as shown in Figure 1, the body is successively charged through one path to be discharged with the spark by another, the current passing through the tissues in the two directions producing long-recognized tonic effects, due to the activities induced in the tissues by the passages to and fro of this penetrating, energetic, substantial form of energy—the electrical ions—which act

mechanically upon all the tissues in the numerous paths. Of the effects of this passage upon the tissues there is an undeniable array of clinical evidence in accord with the physical certainty of such passage.

The local effect at the region of escape of the static spark, the vortex at which the sudden escape of the charge takes place, consists of a local gymnastics of the tissues, thus thrown into energetic contraction with the induction of local activity, in depth and extent relative to the length and volume of the spark discharged. The spark length measures the potential or voltage and the volume or fatness, the amperage or quantity which depends upon the capacity of the source. Local non-infected tissue infiltration cannot resist the proper administration of such energetic force, the fluids being forcibly expelled. Hyperplasia only will persist if requisite energy is employed repeatedly in non-infected indurated areas under these circumstances.

With *the static-wave current* the passage of the current to and fro from the surface of an electrode wherever placed to the whole surface of the body (Fig. 3). Constitutionally, the effects are the same as with the sparks; but, administered as it is, it is the choice of modalities for its general effects upon the metabolism, being painless during administration and a convenient method of administration. Locally, its action is the same as the spark, inducing energetically intense and diffuse local contraction, relieving in an effective manner the infiltration of local stasis, inducing pronounced local activity, thereby restoring activity when areas of functional torpor or local stasis are present.*

The wave current administered from the modern static machine is capable of producing pronounced and deeply-penetrating tissue contraction and localized cell gymnastics, though not approaching in local effect the intensity and energy of the long static spark, escaping, as the spark does, from a single point to which the same energy is directed, but extending the wave current over a considerable area, represented by the size of the metal electrode.

The wave current is capable of inducing tissue contraction of structures situated beneath thick layers of fat, inducing tonic contraction of the abdominal organs. With a spark slowly discharging between the rounded terminals of the discharging rods the synchronous, transmitted impulses of contraction, followed by tissue release in the region beneath an

* In the second report of the Committee on Current Classification and Nomenclature, on page 38, Mr. Wm. J. Jenks, speaking of the static-wave current, makes the following statement: "The small continuous-discharging current will flow through the patient without causing an appreciable sensation."

electrode, constitute an energetic type of tissue gymnastics differing from other types of induced activity in that the action is *intrinsically* a structural activity, instead of *transmitted* vibration, such as is induced by other bodies in motion.

Physiological actions.—The distinctive influences of the static modalities are to induce marked effects upon tissue metabolism, which are evidenced in the effects upon nutrition during the course of treatment—a sense of general warmth during the administration, with induction of perspiration, increased elimination of nitrogenous products by the urine, a sense of fatigue following too prolonged administrations, or a buoyant feeling following proper tonic administration to debilitated patients. All of which indicate degrees of tissue exchange and general functional activity.

The mechanical effects arising from the passage of actual substance in the form of electrons of *one polarity* to and from the surface of the electrodes to the outer surfaces of the body is exerted upon the cell structures, as well as effecting the induction of the peculiar phenomena of polarization, attested by eminent authorities to cause cell protoplasm to take spherical form. The effect of polarization and the mechanical effects exerted by the passage of these rapidly-moving electrons through the tissue, as well as the local contraction of tissue induced beneath the electrode, will vary with the rate of oscillation or spark discharge at the spark-gap, which should not generally exceed six hundred per minute, and as a rule *even* slower rates, that the tissue responses, which are always synchronous with the discharge at the spark-gap, may be more decisive.

The actinic and other antiseptic effects of the convective and disruptive discharges—the brush discharge and spray of the former, and the indirect and resonator sparks of the latter, and the discharge from vacuum tubes—are not peculiar to the static current.

These actinic antiseptic actions cannot be considered as producing remarkable local effects, except in the more superficial conditions, except possibly by their influence upon the blood while passing in its presence through the dilated superficial arterioles and capillaries, rendered hyperemic by the influence of the discharges. It has been demonstrated that in the mucous cavities the effects of these discharges may pass into the tissues beneath the mucous membrane to an extent of from two to four millimeters. Reports from numerous sources of success in the treatment of tuberculosis, gonorrheal rheumatism, and other infectious conditions remote from the surface, indicate to a remarkable degree an influence either due to the effects of actinic or antiseptic properties of the discharges, the electrical action *per se*, or the increased local leucocytosis present

with the active hyperemia induced in tissues, or a combination of effects.

The superficial *hyperemia* induced by the convective and vacuum-tube discharges seems to serve three purposes in connection with their employment: (1) Derivative, associated with the well-established principle of counter-irritation, (2) the actinic and antiseptic effects upon the circulating blood in the capillaries and small arterioles, and (3) the increased presence of leucocytes in the greater volume of blood, and possibly in percentage as well. In the writer's opinion, these influences are the cause of the energetic action upon infected processes more than cataphoric drug administrations.

The direct static-vacuum tube administrations applied from the machine direct, as is the wave-current, the opposite side grounded and the regulated spark-gap discharging, differ in action from the Tesla, d'Arsonval, or Oudin of the static resonator, producing distinctly different local effects. This modality, like the wave current, produces marked tissue contraction, as well as, in addition, the local actinic and antiseptic effects, the former adapting it to the removal of local induration and applicable in all conditions where the presence of walled-in pus does not preclude its employment, and the latter to conditions of superficial infection. The contractions, while similar to the wave current, are not so intense, but serve as an excellent substitute for that current where the possibility of local infection exists, also for treatment of the prostate gland or female pelvic conditions, but to be efficient in many cases will require static machines having twelve or more revolving plates, and is also employed in very many other local conditions in which the wave current is indicated.

The static currents from the resonator are similar to the currents from the numerous types of coil high-frequency apparatus, but of less amperage, and consequently possess relatively less of the actinic properties when derived from the static machines having fewer revolving plates, but meeting the requirements in this particular from those having a large number—sixteen or more—revolving plates.

A characteristic of the static modalities that produce muscular and other tissue contractions is that *a tonic state of contraction persists for several hours* after the application, when properly administered. This fact is demonstrated in the appreciable contraction of the uterus, the relief from pain in neuritis, and the interval of hours before the return of swelling in all superficial inflammations. It is this characteristic which, with proper attention paid to the frequency of treatment, places it in the first place as a means of instituting permanent results in simple inflammatory processes, and in the shortest periods of time.

The therapeutics of static current, as will be appreciated from the foregoing, must be considered from three points of view: (1) The mechanical effects, (2) those associated with polarization and the distinctly electrical, and (3) the actinic and antiseptic.

The indications for the employment of the static currents from the mechanical point of view cover a very wide range of conditions, including all simple non-infected inflammatory processes and the conditions associated with poor metabolism, local or general. It is only in cases involving the closed-in cavity of the skull, through which, owing to the greater resistance of the vault, the current will not to any extent pass, that cannot be influenced to a greater or less extent by the effects of local intrinsic contraction induced by the static modalities, which set up also general cellular gymnastics induced by the surging passages to and fro of the substantial, rapidly-moving electrons. When the general conception of this great principle is once recognized by the profession at large, therapeutics will be enriched and humanity the gainer.

The mechanical influences upon metabolism and local congestion are not confined to electricity; light, heat, cold, mechanical vibration, massage, exercise, and the x-ray exerting an important role in the field of mechanical therapeutics, but the others have no comparison in the energy and selective action of the static current. No one agent does, and perhaps all others combined do not play the part in this particular that the static modalities do when properly employed, though each meets in its own way peculiar indications and conditions.

Looking to the subject from the point of view of *physiological effects* and *therapeutic indications*, the following broad conception of the subject will be taken.

Static electricity, according to the method of administration or modality employed, is characterized by three distinct qualities of action: (1) the mechanical, (2) the actinic from effluve and vacuum-tube administrations, and (3) polarization, electrolysis being insignificant. From the respective effects the following laws may be involved:

(1) The modalities of the static current produce to a greater extent than any other diffuse, penetrating tissue and protoplasmic contraction with a minimum of irritation, when the wave current, static-induced current, the vacuum-tube current, administered directly from the static machine, or the static spark are properly administered. They are, therefore, the measures *par excellence* in therapeutics for the dispersion of *pathological stasis*.

(2) For the same reason as stated in the preceding observation, the same static modalities which mechanically induce tissue contraction, excite vibratory activities in torpid areas, stimulating to a greater degree local metabolism, with re-

establishment of circulation and tissue repair where stasis and impaired or obstructed elimination are present.

(3) Another mechanical effect associated with the administration of the static modalities administered with the patient insulated, is occasioned by the surging of the current from the point or surface of application or discharge. The effect of the passage of the substantial electrons is to induce degrees of general metabolism which is evidenced by the marked increase of secretion and general awakening of functional activities.

(4) Polarization associated with the passage to and from through the patient of one polarity with a unidirectional current, induces effects in the tissues which coincidentally awaken in another way activity.

(5) *The actinic effects*, in common with the high-potential coil and static modalities associated with the radiations evolved within the vacuum tubes and the convective discharges (the effluve, the brush-discharge, and spray), are capable in varying degrees, according to the volume of current evolved, of destroying germ life superficially located, and in some instances to considerable depth within the tissues.

(6) *The phoretic action* of the current administered with the vacuum tube is capable of forcing into the tissues minute particles of nitrous acid evolved by the discharges and other medicinal substances, rendering them valuable in the treatment of superficial infected conditions.

(7) Muscular spasms of peripheral origin are locally relieved by the static modalities, either by the removal of sources of irritation or direct action upon the neuro-muscular mechanism.

These broad conceptions of the indications for the employment of the static modalities would indicate their use in all non-infected inflammatory conditions internal and external, and for the energetic re-establishment of local and general metabolism. The following special indications are conserved by them:

(8) The static spark and static-wave current, and to a less degree the brush discharge and the direct-vacuum tube current, are the means *par excellence* for the treatment of all *non-infectious joint inflammations*.

(9) In the treatment of uncomplicated *neuritis* in regions accessible (the only exceptions being within the pelvis, chest wall, and cavity and bones of the skull) the static-wave current, static spark, brush-discharge, and direct-vacuum tube current, alone or in combination, are uniformly effective in skilled hands and the choice of methods in those cases.

(10) In the treatment of *spinal cord affections* of a non-infectious inflammatory character including *tubes*, *anterior poliomyelitis*, *myelitis*, *syringo-melia*, and the *dystrophies*, the

static-wave current to the spines and sparks to the periphery, in adults meet the conditions present, to effect which they must be applied with great energy over the site of the lesion of the cord.

(11) In the treatment of *pelvic* and *genital* conditions non-septic in character, the static-wave current, and direct vacuum-tube current, are effective in the following conditions: *uterine congestions and dysmenorrhea, subinvolution, cervical ulceration, salpingitis, ovaritis* (usually secondary), *urethral caruncles, hemorrhoids* (not indurated), *fissure in ano, rectal ulcers, prostatitis* (not removing hyperplasia), *vesiculitis* (specific and non-specific), *congestions in the spermatic cord and canal between the internal and external rings, epididymitis, orchitis, chronic gleet, and impotency*. In all of these cases named those modalities are most effective, safe, and cordially to be recommended.

(12) In the following *glandular congestions* either the wave current or direct-vacuum tube current are the choice of modalities. In enlarged and congested liver, spleen, simple adenitis, in simple mastitis, and tonsilitis, before the suppuration has advanced, over the pancreas in diabetes, the kidneys in Bright's disease, the adrenals in Addison's, and the thyroids early in simple goitre and Graves's disease; over the stomach, duodenum and ileum when secretions are abnormal or deficient; over a dilated stomach and constipated bowels. In the above conditions the static modalities are very effective, more so than other agents in most cases, because by inducing active energetic contraction they remove congestion and infiltration, and restore tone and metabolism.

(13) Conditions of *spasm or muscular contraction* are relieved by the static modalities, particularly by the sparks and wave current. Either through the secondary effect of relieving congestion, as when associated with joint diseases, in dysmenorrhea or vaginismus or by the direct antispasmodic influence in other conditions, as in high-arterial tension and acute spasm, as in muscular cramp.

(14) On *general and local metabolism*, when not complicated by organic disease, the static modalities, particularly the wave current, are remarkably efficacious and indicated as part of the régime in all cases; because all of the functions are demonstrated to be quickened; weight increased, hemoglobin percentage is increased, an approach to normal in the blood-count induced; all due undoubtedly to a quickening of cell activity throughout the economy, owing to the stimulating influence of the passage everywhere of the rapidly-moving electrons.

It was moved that this report be received and placed on file. Seconded, and carried.

The Journal of Advanced Therapeutics

VOL. XXVI.

DECEMBER, 1908.

No. 12.

DISRUPTIVE HIGH FREQUENCY DISCHARGES, BY THE REACTION METHOD, AS A NEW AND IM- PORTANT THERAPEUTIC AGENT.*

BY M. W. BRINKMANN, A.B., M.D., NEW YORK.

A large experience during the last eighteen months has gradually developed a conviction on the part of the writer, that the regenerative capacity of the more highly organized human tissues has been unrecognized, suspected, or believed in, according to the close or lax observation of the physician to the responses given by the tissues to the procedures applied to them. Where, as in the case of the actual cautery, the chain of phenomena has been obvious, no obscurity existed; on the other hand, where slight changes only occurred from a physical treatment, no proper estimation of their existence and significance developed.

In view of the fact that the sensory apparatus of man is persistently estimating and measuring during the allotted period of life every impression by which the sensorium can be influenced; there must develop a very refined and graduated capacity to respond to all external influences sufficient to call forth a response.

Since we are perfectly familiar with the fact that any degree of energy may be the source of a sensory impression, and that, according to degree, will be the acuteness of the perception; so a tissue at variance with its normal sensory capacity may be hyper-esthetic or again anesthetic.

As practical men we are perfectly familiar with the fact that there are degrees of anesthesia and that this term is a relative one; further, that the amount of stimulus necessary to secure a response is dependent not alone upon the degree of anesthesia, but upon the vigor of the agency employed to impress the sensorium.

* Read before the Eighteenth Annual Meeting of the American Electro-Therapeutic Association in New York, September 19, 1908.

In our modern forms of high frequency apparatus we possess a method of developing a form of energy so plastic that we can generate a perfectly regulated current of such great delicacy that the most sensitive nerve does not respond to its stimulus, or, again, it may be applied with such a high degree of potency that it instantly destroys any tissue with which it is brought in contact when disruptively discharged.

It is unnecessary in this paper to discuss the character of the apparatus employed for the generation of the current used. Except that for heavy serious work, only, the coil apparatus is efficient. It is, however, necessary to impress upon all contemplating the use of this method the importance of thoroughly controlling and measuring the current employed. A voltmeter, ampermeter, and all necessary rheostats should be in the primary circuit. We can in this manner calculate with great nicety the voltage or foot pounds of energy used. Records must be carefully kept of each application, for reference in case of subsequent treatments.

A disruptive discharge implies an air gap; it is necessary, therefore, that the operator be provided with an efficient vacuum apparatus, in order that all fluids be removed from the field of application and that the vacuum apparatus be capable of perfect regulation in order to avoid contact of adjacent or contiguous tissue, through too high a degree of vacuum. Complete desiccation of the tissues is unnecessary, as we must only secure the removal of that excess which could, by capillary attraction, enter the insulating and spacing tube, the occurrence of the latter would render the treatment inoperative for the purposes desired, as we would then administer a convective instead of a disruptive discharge.

The current may be applied either monopolar or bipolar or by the condensation method. In the latter instance the body and especially the part under treatment becomes a true electrical resonator.

In contradistinction to the so-called fulguration method, my procedure endeavors to secure sufficient impression upon the tissues to call forth an influx of blood and nervous energy, and in a degree sufficient to produce the results which are sought. It is, therefore, a method which aims at higher vitalization and not as in the fulguration method at destruction of tissue, except only lowly organized tissues and cells.

The duration of a treatment is brief and is determined by a primary anemia, which is perfectly obvious. The cessation of the treatment is followed by a congestion, depending for its vigor upon many conditions, which must present themselves at once to every careful operator. One may aim at a gentle reaction or again at an intense one, lasting many days.

The energy and frequency of the treatments is, therefore, dependent upon the results we aim to secure.

The electrodes must be exactly adapted to the location under treatment and are invariably provided with an insulator, whose function is to insure the delivery of the spark at the desired point, from the sharp metallic end of the electrode. Where a metallic speculum is used, very great care must be exercised in the preliminary arrangement for delivering the electric discharge. Glass, hard rubber, or other such devices are preferable as specula; or a glass or rubber tube may be inserted within the speculum in addition to the one covering the metallic electrode. The metallic electrode should be so adjusted in its glass sheath that a definite spark length will be secured.

Labile applications are made where areas of any extent are to be treated, and a moderately slow, sliding movement will accomplish the desired result.

Where very heavy currents are employed and the condenser couch is used there will be a white discoloration of the epithelium on mucous surfaces, which is probably a destructive process to the superficial epithelium.

I have rarely found a current greater than 600 watts necessary—even in carcinoma of the uterus—that is, 120 watts and 5 amperes. This being used with the auto-condensation method and a labile application from the fundus to the cervix—total time of applications at different times from one-half to two seconds for the whole endometrium.

As applied to cutaneous conditions we get primary anemia followed by congestion—either light or heavy as desired. In the congestive period we have a well-defined red areola with a proportionate amount of heat. This procedure is obviously valuable for all forms of localized pigmentation, sluggish ulcers, the obliteration of fine blood-vessels when heavily applied. Superficial tubercular conditions are beautifully responsive to the same method.

To mucous membranes we may apply the procedure for a

very great number of conditions. The tarsal conjunctiva, nose, pharynx, eustachian tube, mouth, equally valuable in the vagina, uterus, rectum, and urethra. In the female bladder through a Kelly cystoscope it is very practical with a small lamp mounted in the distal end of the cystoscope.

The treatment produces a stinging sensation, but is well borne without any anesthesia.

In fact, anesthetics to a certain degree impair the capacity of reaction in the sensorium and thus necessitate vastly greater amounts of energy to secure the necessary results.

I should also state that all forms of hypertrophied mucous membranes are instantly contracted by this form of administration. The application for this purpose must be briefer than when reaction is desired.

The use of the static spark in the past for somewhat similar purposes is known to every practical worker but the efficiency is so small as to make it valueless for serious work of this kind.

54 W. 90th St.



THE TREATMENT OF THE ENLARGED PROSTATE BY THE HIGH FREQUENCY CURRENT.*

BY M. M. JOHNSON, M.D., HARTFORD, CONN.

Embryologically the prostate gland, which is present in all mammals, is classed with the generative system, but when it is enlarged it has much to do with the urinary system, especially as it interferes with the function of the bladder. There is no one condition of senile life which has caused so much discomfort, anxiety, and actual suffering as does the enlarged prostate.

To overcome or ameliorate this condition has engaged the best thought of the medical profession. Until within recent years, the use of the catheter seemed to be the only relief. Surgery, which has done so much for suffering humanity in other lines, has come far short of giving the desired relief. The advance of senile decay, with its weak and dilated heart, sclerosed arteries, and an exhausted nervous system, consti-

* Read before the Eighteenth Annual Meeting of the American Electro-Therapeutic Association in New York, September 19, 1908.

tutes a great barrier to successful prostatectomy. Many patients will from choice prefer to abide their present discomforts to taking their chances with the results of an operation.

Complete castration has been, and still is, practiced to quite an extent, with the idea that the atrophy of the prostate will follow the operation, but some recent facts concerning the physiology of the testicles and prostate are shown by Serrabach and Pares. They hold that castration may produce atrophy of the normal prostate, but not of a pathological prostate. This explains why the anticipated atrophy did not follow castration.

After considering all the methods and devices for the relief or care of the enlarged prostate, from the use of the catheter to castration and prostatectomy, and noting their results, we are forced to look to the electrical modalities to solve the problem.

Dr. Hunter, of Norfolk, Virginia, brings the Roentgen ray to the foreground, as a treatment of the hypoertrophied prostate, on account of its well-established atrophying power on glandular tissue. He gathered the reported results of six operators with the Roentgen ray with very fair results. The data and technique are not very accurately given. Gautier directed the rays upon the lower abdomen and perineum. As the prostate is located under the os-pubis it would shield it from the full extent of the rays. There is no doubt that the Roentgen ray is potent in absorbing glandular tissue, but the difficulty lies in concentrating the rays on the prostate.

We have many reports that the direct, continuous current was used with some solid electrode for a while, and seeing the patient later, he considered himself cured.

Chandler, of Chicago, uses vibration down the spine, and vibration on the prostate, together with various electrical modalities daily, for three months, but does not mention any cures. Such treatment is trifling with a serious condition. From all the indefinite results reported, it is evident that all the electrical modalities have some effect on certain prostatic conditions.

What we want is a report of a series of prostatic diseases carefully diagnosed, classified, and the clinical features accurately noted. The electrical modalities used should be of an

approved standard. Amperage and voltage should be given. If the static wave-current or the static high frequency are used in addition to the voltage and amperage, the length of the spark and the number of impulses per unit of time should be given. The results of this class of work will make valuable records.

When considering the various electrical modalities used in prostatic work, the question arises as to which is the most efficient, and which will reduce the enlarged prostate in the shortest time, with the least inconvenience to the patient.

While admitting, as we already have, that all modalities have more or less atrophying effect, we will all agree that the greatest potency is found in the Roentgen ray, static wave-current, and the high frequency current. While the Roentgen ray is the most powerful of the three, yet as has been shown, it is the least effective, owing to the difficulty in concentrating the rays on the prostate, to say nothing of the injury to healthy tissue during the effort to reach the prostate. Owing to this uncertainty as to the effective action of the Roentgen ray on the prostate, we are justified in eliminating it from further consideration at present. This brings us to the consideration of the static wave and the high frequency currents.

In the very excellent article by Dr. Pitcher, read before this society at its last meeting and published in the *JOURNAL OF ADVANCED THERAPEUTICS* in November, 1907, he states "that he uses the static wave-current." He used the metallic electrode attached to the positive pole of the static machine, while the negative was grounded. He used a low rate of interruption, 200 to 300 per minute. If the higher rates of interruption are employed, the gland is held in a state of tonic contraction, without permitting intervals of relaxation. He does not claim that the senile hypertrophy can be cured, but that the patient can be made more comfortable. He uses the metallic electrode and, as we would expect, he gets rhythmical contractions accompanied with more or less pain, but he gets no actinic effect. If he had grounded the positive pole and had used the vacuum glass electrode he would have had better results.

To Dr. Titus, of New York, is due the credit of devising the insulated vacuum electrode. With this improvement, he has found that it has not only hastened the atrophic process of

the prostate, but that it has a bactericidal effect on the gonococci lodged in the prostate. There is no question as to the efficiency of the vacuum electrode over all others.

Dr. Titus's technique is worthy of consideration: "After the rectum has been emptied, the patient is placed in the Sims position, upon an insulated platform; this platform should be insulated by glass legs not less than twelve inches in length, and be at least three feet distant from the machine. The vacuum tube, after being lubricated, is then passed into the rectum and up against the prostate gland or seminal vesicles. The instrument is held in position by an ordinary tube-holder and stand. The ordinary connecting wire or rheophore is fastened to the electrode and to the negative side of the static machine. The strength of the current is determined by the length of the spark-gap between the balls of the sliding rod of the machine." He begins with a small spark-gap and gradually increases according to the effect produced and the tolerance of the patient. The treatment should never be painful.

HIGH FREQUENCY TECHNIQUE.

The patient is placed upon the treatment couch in the Sims position. It is not necessary to insulate the couch. Snow's vacuum rectum tube is lubricated and passed into the rectum and placed firmly against the prostate gland. It is held in position by the hand of the operator. The sphincter ani muscle acts as a fulcrum. The operator raises and lowers the handle of the tube-holder, moving the electrode over the entire surface of the prostate gland.

The high frequency current being a monopolar current, it is not necessary to have a ground wire. The tube-holder is connected with the resonator by a single wire. The strength of the current is indicated by the spark-gap. I open the spark-gap one inch, which gives the current a powerful actinic effect. The patient is not conscious of the least discomfort. In fact, he could not tell when the current is turned on or off, by any sensation it gives. We have efficiency and comfort combined with the use of the high frequency.

The technique of application is as follows: With a high speed static machine with two 32-inch rotating plates, running at 910 revolutions per minute, I get 120,000 volts and 55-100 of a milliampere. When the condensers and surge resonator

are thrown into circuit, then the discharge balls one and one-third inches in diameter are drawn apart one inch,—the pulsometer shows 1,500 interruptions per minute. I found that a higher or lower rate of interruptions did not give as satisfactory results.

REPORT OF CASES.

Case (1). Active business man, age seventy-nine. For the last ten years has had frequent attacks of prostatic hemorrhage—three to five ounces of residual urine—night urination four to six times. After twelve treatments, prostate soft and patulous—residual urine few drops—urinary function quite restored. Had no return of the trouble—died within the last few months.

Case (2). Physician, aged sixty. Had enlarged prostate ten years. Night urination four to six times—residual urine two ounces. October, 1906, after giving ten treatments—prostate normal—all symptoms subsided—night urination one time.

Case (3). A very typical case. All the urinary troubles present. Prostate enlarged—fibrous variety—constant uncomfortable feeling—very sensitive to touch—residual urine two ounces. January 8, 1908, first treatment—ten minutes. January 20th, fourth treatment—prostate reduced one-half—night urination three times. January 29th, eighth treatment—prostate normal size—night urination once—no residual urine—treatment stopped. March 29, 1908, prostate normal. September 13th, prostate still normal. Night urination once or none.

Case (4). Frank T. B., age fifty-five; brick mason; diagnosis, fibrous enlargement of prostate—sensitive to touch—urination difficult—night urination four to six times. Examined by Dr. Boucher (surgeon) before treatment. He had expressed doubts as to the efficiency of the electrical treatment, but confirmed the diagnosis. Treatment, ten minutes every second day. Before the tenth treatment Dr. Boucher made another examination and said, "The prostate is gone." Eleven treatments in all. Night urination once.

Case (5). John S., age eighty-six years; dribbling urine for many years. Diagnosis, an exceptionally large fibrous prostate. Urinates many times at night—residual urine three ounces. First treatment, June 30, 1908, fifteen minutes each.

Ninth treatment, residual urine two ounces—prostate one-half former size. Eleventh treatment, he says that he passes urine comfortably. The old man had to come two miles and was taken ill, so he could not take more treatments.

Case (6). A. O., aged fifty years; painter; diagnosis, enlarged prostate. After eleven treatments, ten minutes each, the prostate was normal in size. Urinary function normal.

Case (8). I. W. R., aged forty years; salesman; married. Has been suffering from melancholia for fifteen months. Twelve years ago had a similar attack, lasting a year and a half. In both attacks he had an irritable condition of the genital organs. I made a rectal examination and found that the sphincter ani muscle strongly contracted. It was with difficulty that I could dilate it sufficiently to introduce the finger. The prostate gland was moderately enlarged, but the most marked feature was the extreme sensitiveness of the prostate to the touch. After three treatments, ten minutes each, the sphincter ani muscle was easily dilated. After ten treatments the prostate was reduced to its normal size. The irritation of the genital organs had entirely subsided.

The determination of the amount of residual urine is interesting, as a record of the result of treatment and final condition of the prostate, but I would recommend that it be dispensed with, as in some instances great injury is caused by the passage of the catheter. The diminution in the size of the prostate can easily be determined by a digital examination, as well as by the improvement in the ease of urination.

The presence of an inflammatory condition of the prostate in so large a percentage of cases of men in early or middle life, who are subjects of nervous breakdown, would reasonably raise the question as to what extent the condition of the prostate is an etiological factor in these cases.

In this report of progress the conclusion is that at the present time the "static wave" and the "high frequency" currents are the modalities which are the best adapted to the treatment of the hypertrophied prostate.

Of the twelve cases treated, six were senile hypertrophy and six were in men under forty-five years of age, who were suffering from nervous breakdown.

The humane feature of the electrical treatment is so marked—no ether, no vomiting, no nervous shock, no tedious conva-

lescence, no loss of valuable time, no operation, and no death. It is ideal.

Discussion.

Dr. William B. Snow, of New York, called attention to some particular points upon which he wished to lay stress. In his experience with upwards of seventy-five cases of prostatitis he has obtained his best results with the metal electrode. His early experience had been entirely with the metal electrode applied in the rectum. His percentage of cures was more than 80 per cent. The cases he was sure were, most of them, such that would have been refused any other treatment except operation. They were cases in which the prostates could not have been reduced in size by anything except the mechanical effects of the static wave-current. Prostates with a varied percentage of inflammatory and hyperplastic tissue will always give average results depending upon the amount of hyperplastic tissue present. His experience had led him to believe that in all those cases the simple metal rectal electrode would give as good results as anything of late devised. In the treatment of his early cases he took care to place the old-fashioned electrode in position between the two lobes; when both sides of the gland would be thrown into contraction with each discharge at the spark-gap of the static machine. The first man he treated did not retire at night because of the necessity of arising so often. He was sixty-three years old; and is now seventy-one. He was cured in eleven treatments of twenty minutes each with a spark-gap of four inches and has not had a relapse. He mentioned this in order to call attention to the good results obtained by any means which threw the glands into successive contractions. The results were obtained without moving the electrode about, which he did not consider necessary. He was using in the treatment of hypertrophied prostates an electrode with a small curve; it was of metal and about three-quarters of an inch in diameter, but was so difficult to keep in position that it has been abandoned. The technique was not a difficult one in this class of patients. A spark of four inches was usually used. He never used for this purpose any but an eight-plate Holtz machine, or the current reduced to an equivalent from a larger machine.

Dr. Edward C. Titus, of New York, congratulated Dr. Johnston on his results and thanked him for the allusion to his own paper on a similar subject. He used a metal electrode when treating the non-infected cases when there was purely a hyperemic condition of the prostate with moderate enlargement. The actinic efficiency of the vacuum tube electrode, together with the deep and profound tissue contractions produced by the high potential static current gives the best results in the infected class of cases. The action of high potential

static currents when employed by means of the vacuum electrode, excited from the negative side of the static machine, produces on the surface of the electrode when in contact with the parts, a disassociation of the atmosphere into ozone and nitrous acid, which are forced into the tissues to a depth of from two to six mm. and there exert a positive bactericidal effect on the local infection.

Dr. Herbert F. Pitcher, of Haverhill, Mass., believed that great care should be taken in making a diagnosis of the different conditions of the prostate. There was no one particular method that should be used for all prostatic troubles. He tried to bring out in his paper of last year that in the congestive forms the wave-current was more effective in its results; whereas, in the prostatic enlargements of gonorrheal origin, the high frequency current was the more effective. And in the fibroid prostate the continuous currents should be used. He said they should use judgment and care in selecting the form of treatment for the particular case in mind. The surgeon of to-day would not operate upon a patient unless the condition was a recent one, *i. e.*, before the onset of bladder complications or before there was much prostatic enlargement. The surgeons had gotten over operating on old cases. There were patients who always waited until the last moment before seeking operation. These were the cases that electricity could benefit many times, the cases that would not be operated upon. One should discriminate more in all cases.

Dr. Morris W. Brinkmann, of New York, said that for three years he had been trying to get rid of the term, treatment with the high frequency high potential. In the high frequency current the oscillations were greater than billions per second. The value of the treatment was in the slow frequency. One must distinguish between the slow and the high discharge rate. Tissue has its limitations to the perception of stimuli and their rate, necessarily the response is the thing we aim to secure. The more thoroughly we secure reaction the greater and more prompt is the result.

Dr. M. M. Johnson, of Hartford, Conn., said: I am much pleased with the credit that has been given my paper by the gentlemen who have spoken. Electricity is certain to mark an epoch in the treatment of the enlarged prostate, eliminating as it does the undesirable features attending a prosta-tectomy. It covers every condition necessary for a thorough and satisfactory treatment.

In reply to Dr. Brinkmann's question as to whether or not I used a high frequency current, I would say if the doctor had followed my technique of application he would find that I not only had a high frequency current, but that I had one of the highest possible efficiency. It was this efficiency that has given me the results stated in my paper.

TREATMENT OF VARICOSE VEINS AND VARICOSE ULCERS BY THE STATIC WAVE-CURRENT.*

BY H. FINKELPEARL, M.D., PH.G., PITTSBURG, PA.

There are few chronic diseases which cause as much discomfort to the patient and annoyance and disappointment to the physician as varicose veins and varicose ulcers of the leg. A brief review of the etiology and morbid anatomy of these conditions will more fully justify the rationale of the Morton wave-current as a therapeutic agent from which excellent results may be expected.

The causes of varicose conditions may be divided into: (1) predisposing, (2) exciting. Predisposing causes may be further subdivided according to sex and conditions: (a) Women are more predisposed than men. (b) The tendency to the development of varicose veins and ulcers increases as age advances. (c) Mechanical obstructions, as the wearing of tight garters or similar obstructions around the thigh or leg, favor the condition. (d) Occupation. Any occupation requiring habitual long standing.

The exciting causes are chiefly: (1) Pregnancy. By pressure of the enlarged uterus on the iliac veins. (2) Diseases of the heart and lungs, where the power to drive the blood properly is lacking, and stagnation or stasis results. (3) Tumors of the abdomen or pelvis, by pressing on the iliac veins, obstruct the venous circulation and are an exciting cause.

By the removal of these causes the ill effects already produced are not always removed. The havoc played by the long interference with the venous circulation only, too often leaves a life-long legacy to the suffering patient, on account of the changes produced in the walls of the veins.

Varicose veins, as seen in the lower extremities, their usual seat, are distended, tortuous, superficial veins, giving the leg or thigh a bluish, mottled appearance. Owing to the inherent elasticity of the muscular coat of the veins they will distend or bulge out to a large extent, and it is due to this elasticity that rupture of these veins is not a more frequent occurrence. Quite often instead of the overloaded veins bulging out super-

* Read before the Eighteenth Annual Meeting of the American Electro-Therapeutic Association in New York, September 19, 1908.

ficially they cause a passive exudation into the surrounding cellular tissue of the leg, resulting in edema. Upon this edema there is often engrafted a most obstinate eczema, which may progress to ulceration and form what is known as varicose ulcer.

The treatment consists in first removing all the causes which produce venous stagnation, and then order the recumbent position, with the affected limb or limbs elevated to encourage venous return circulation. To prevent aggravation of the trouble an elastic stocking is indicated. But this is only palliative treatment and does not give the results our patients desire. Radical relief has heretofore been found only in surgical procedures such as multiple ligation or excision of the veins or the injection of pure carbolic acid into the tissues about the vein. Such operations require an anesthetic and are not free from danger of septic phlebitis or even pyemia.

The treatment of varicose ulcers has been unsatisfactory in spite of the use of ointments, dusting powders, lotions, and even skin grafting. In the Morton wave-current, however, we have an agent which has given in a number of cases, in which I have employed it, most gratifying results.

I have selected from my casebook three cases which I take pleasure in reporting.

Case 1. Mrs. N. M., aged sixty-four. Mother of eight children. Had varicose veins as a legacy of her many pregnancies. In January, 1907, her right leg became edematous and painful. Rest, position, lotions, and ointments were tried, but without giving any relief. I was called to see her in May, 1907, and when I learned that almost everything had been tried, but without avail I suggested that she be brought to my office to be treated with electricity. As she was unable to walk she had to make her first two visits to my office in a cab. The method of application was as usual. She was placed on the insulated chair, her leg elevated and a piece of block tin, 6 by 8 inches, was bandaged over the part affected. This electrode was connected by a fine wire to the positive side of the static machine and left side grounded. As the first sitting not more than one-half inch separation of the rods could be tolerated. This was increased at every sitting until a distance of four inches could be comfortably tolerated. The patient was greatly relieved after the second application.

Treatment was begun July 1st and was given at first every other day, and as improvement was noticed every third day. The last application was given on August 29, 1907. The edema had entirely disappeared, there was no discomfort of any kind, the external appearance of the leg was almost normal, and the patient was very grateful and surprised at the recovery of her limb after she had abandoned all hope for relief.

Case 2. Male, aged forty-two. Railroad switchman at the time of treatment, which was in October, 1907. Former occupation, waiter. Right leg was painful, edematous, and mottled. There were two ulcers, one the size of a nickel, the other a little smaller. After six applications of the Morton wave-current the pain ceased, the edema subsided considerably, the ulcers healed, and the patient returned to his work. In a few days he returned with the larger ulcer broken. Four applications of the Morton wave-current resulted again in healing of the ulcer. The patient again returned to his work. Ten months have passed since and there has been no relapse.

Case 3. Male, aged forty-four. Occupation, merchant. Two years ago he was struck with an iron bar over the lower third of the leg. This was followed by ecchymosis and the other usual symptoms of contusion. After a few weeks the part became edematous. This was followed by a squamous eczema with all the signs and symptoms. The severe itching superficially and pressure pain within the deeper tissues caused sleepless nights and disabled him from his usual occupation. The Morton wave-current was applied to the part affected every other day. The itching pain and edema subsided gradually after each treatment. After the sixth application when the patient felt considerably relieved, he was compelled to leave the city on account of business and I regret that I could not follow up this interesting case to recovery. I have now three cases of varicose ulcer under treatment, and if the results will be of interest to the fellows of this association I will report them at some future date.

1906 Fifth Ave.

Discussion.

Dr. William Benham Snow, of New York, commended the doctor upon his particular method of treatment, and called attention to the fact that there were other ways of effecting

it. Dr. Snow's method was with the static brush discharge. The indication was to get rid of the induration; when this was accomplished the ulcer would heal. The only objection to the wave-current was that if the metal was placed over the ulcer the current would pass through that channel. Besides the static brush discharge he used a bandage of crepe velpau, which is more comfortable than the rubber, and his success had been uniform.

As to removing the causative factors in these cases, attention to phlebitis was important. There was, in his opinion, no better treatment of the latter condition than the static brush discharge preceded by a prolonged application of light. Dr. Snow had recently had seven cases of phlebitis, of from a few days to several months duration, and all had been promptly relieved by applying the light and brush discharge. As a preventative treatment of ulcer, this was one of the most important procedures.

Dr. George Betton Massey, of Philadelphia, suggested the use of Z-O plaster in the cases where gentle pressure was wanted; this should be applied nearly around the limb, and extend one inch above and one inch below the ulcer. He had had wonderful results from the high frequency as well as the wave discharge, but the latter only helped temporarily.

Dr. George Z. Goodell, of Salem, Mass., said that he never used the rubber bandage in these cases. Minot thirty years ago had suggested the use of baby's flannel which could be washed. He also used dry hot air.

He did not mean to say that he had cured these cases, but in cases of varicose veins there were general causes, except in the traumatic cases. In such cases they had to look after the leg for months and even years.

Dr. Thomas W. Brockbank, of Philadelphia, said he had enjoyed the paper very much, but he did not think that Dr. Finkelpearl had proven that there was much varicosity present in the cases he reported. One of the cases was due to traumatism. He did not mention anything about the condition of the veins in the other cases. It was his experience that where the cases were advanced, it made no difference what they did to heal the varicose ulcer, it was only temporary improvement. When the vein becomes knotty there was no modality that was going to restore the limb. In those cases where we expect to make a permanent cure we must apply some artificial support, or else remove the veins. One should bear in mind that there are cases in which surgical methods are absolutely necessary. Where the superficial veins are dilated, if we expected to get a permanent cure, these veins must be extirpated. Therefore, in such cases, he opened and extirpated the veins. Then would follow a permanent and complete cure.

Hot air had been spoken of, but the rational thing to do, so

far as the mechanical means were concerned, is first to improve the nutrition of the parts. Give a large supply of healthy blood to the neighborhood. The incandescent light, or hot air oven, either alone or combined, was good treatment and would aid in getting a larger amount of good healthy blood to the parts. Then let the patient rest an hour if possible until the process had accomplished the purpose intended. Then apply the Morton wave-current and you would get rid of the exudate made soluble by the first part of the treatment. This he believed to be the scientific method of procedure in such cases.

Dr. H. Finkelpearl, of Pittsburg, said that he never omitted the use of artificial support; he always ordered an elastic stocking.



ROENTGEN RAY DIAGNOSIS OF THE DISEASES OF BONES AND JOINTS.

BY AMÉDÉE GRANGER, M.D., NEW ORLEANS.

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(Continued from p. 566.)

Cyst of bones is rarely found outside of the bones of the head. It is usually the result of a former osteitis. It could not be diagnosed on a radiogram from a small medullary giant-cell sarcoma before the latter breaks through the bony wall (Fig. 2).

Osteomata. New bone growths may start from the periosteum—exostosis—or they may start from the interior of the bone—enostosis. The former may appear anywhere; the latter are seldom found outside of the bones of the head. They would be recognized on the skiagram as irregular, dark masses, attached to the bone. (Fig. 3).

Osteo-chondroma develop beneath the periosteum most frequently in the femur or tibia near the knee-joint, forming a club-shaped enlargement of the bone, resembling somewhat the immature bone tissue seen beneath the periosteum in developing bone.

Osteo-malacia consists in a softening of the fully-formed hard bone tissue by the removal of its inorganic salts. On the radiogram it would be diagnosed by the pale bone shadow

and the bending of the bones. This affection usually occurs in adults, most frequently in females during pregnancy and after parturition.

Differential Diagnosis of the diseases discussed in this paper,



Fig. 2.—Bone cyst of radius.

the one which is most likely to be confounded with some other disease, is osteo-sarcoma; because of that and because of the serious import of such a mistake, I shall devote a few lines to its differential diagnosis.

Osteo-sarcoma must be differentiated from osteo-myelitis, tuberculosis of bone, syphilis of bone, osteomata and metastatic hypernephroma.

All cases of osteo-sarcoma seen by the writer, with the



Fig. 3.—Osteoma.

exception of one case of medullary giant-cell sarcoma, presented the characteristic frost-like appearance.

Large Osteomata. Either exostosis or enostosis are the only other diseases of the bone presenting shadows which have any resemblance to the characteristic appearance of sarcoma. This shadow, however, is much denser, does not involve the entire bone segment and does not merge into the soft parts.

Osteo-myelitis shows in circumscribed cases the light central shadow surrounded by the dark rim of osteo-sclerosis; in extensive cases, with extension of inflammation to the soft parts, there is a honeycombed appearance of the bone, with or without the presence of sequestra. While in sarcoma the normal bone shadow disappears and is replaced by the characteristic shadow, which fades away into the surrounding soft parts.

Tuberculosis of Bone shows the indefinite pale shadow and the bone atrophy. It nearly always begins at the epiphyses and very frequently spreads to the joint. Sarcoma, quite the contrary, very rarely involves the joint, except in the later stages.

Syphilis of Bones shows darker shadows. The periosteum often presents an irregular raised appearance over a greater area than is seen in sarcoma, and there is no blending or extension to the soft parts as in the latter disease.

Metastatic Hypernephroma. This condition could not be differentiated from the medullary giant-cell sarcoma on a skiagram. But a pathological fracture in an elderly man would make one suspect hypernephroma and the examination of the renal regions would clear the diagnosis.

Scurvy, although not truly a disease of bones, causes frequently-subperiosteal hemorrhages, which are most generally found at the lower extremity of the long bones, shows this condition most marked at the lower end of the femur.

Arthritis. The synovial sac becomes filled with serum, sero-fibrinous fluid or pus, depending upon the nature of the infective agency. The skiagram shows the increased interosseous space and the distended joint capsule. The density of the shadow will of course depend upon the nature of the fluid in the synovial sac.

Mild cases undergo resolution. The more malignant ones cause extensive destruction of cartilage and bone. The majority of cases become chronic. Here we find the following joint changes: At first the synovial membrane is congested and its tufts are prominent. Later there is more or less destruction of the synovia, with the formation of small adhesions and the tufts become large and projecting. As the disease advances the cartilaginous surface is discharged and replaced by granulation tissue. Fibrous ankylosis often results.

Arthritis Deformans. This name has been applied to a variety of chronic inflammation of joint which combines with degeneration of parts of the joint and the new formation of bone may result in marked deformities of the part. The capsules are thickened and sclerosed, the tufts of the synovial membrane are changed into cartilage, new bone growths from the articular cartilages, from the joint capsules, and even from the ligaments.

As a result of the changes which take place in the basement

membrane and in the cartilage, the latter become destroyed from pressure during the movements of the joint and the bone is laid bare. This is shown in the skiagraph by disappearance of the normal articular shadow.

The ends of the bones are much deformed. They are flattened and made broader by irregular new growth of bone, while



Fig. 4.—Dislocation of semilunar cartilage forwards.

at the same time they atrophy. The new growth of bone starts from the articular cartilage.

Tubercular Arthritis. This affection usually begins in the synovial membrane of the joint, or it may extend to the joint from adjacent bone. It is characterized by the formation of

tubercle tissue and granulation tissue and is usually associated with secondary inflammation and degenerative changes of the surrounding part. This disease is most common in children and young persons and usually affects one of the larger joints. It is recognized on the radiogram by the paler hue of granulation tissue.

As the disease advances and the articular ends of the bones become involved, this is plainly seen on the x-ray negative by the paler shadow and the atrophy of the affected bone. Later the area and extent of the bone destruction, with resulting deformities, show distinctly.

Loose Cartilage in the Joint. Figure 4 shows a loose outer semi-lunar cartilage, slightly dislocated inwards.

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CATAPHORIC OPERATIONS AS MODIFIED BY THE TOPOGRAPHIC SITUATION OF PARTICULAR NEOPLASMS, WITH DETAILED REPORT OF CASES.

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(Continued from page 754.)

No. 163. ONCOLOGIC HOSPITAL. *Rodent Epithelioma of Nose.*—J. C., aged 69, admitted to house June 26, 1905. The tip and both sides of the nose were the seat of a deep erosion, leaving but about two-thirds of the external nose unaffected. The disease had been present for sixteen years, during ten of which extensive progress had been made. Caustic paste had been applied one year before, and the x-rays at a city hospital.

Minor applications proving too painful, he was placed under ether July 12, and a major monopolar application made of 350 to 400 milliamperes for 50 minutes, about 12 very small needles being used. Recovery was uneventful, and he was discharged August 1st. There was no recurrence, the patient dying a year later of pneumonia.

No. 164. ONCOLOGIC HOSPITAL. *Lupus of Face.*—J. O.,

aged 49, admitted to dispensary June 26, 1905, with a lupoid patch on left cheek. Minor applications of 3 to 5 ma. were given on several occasions, when the patient abandoned the treatment. In December, 1907, reported at dispensary by request in excellent condition, having received x-ray treatment at a hospital near his residence.

NO. 187. ONCOLOGIC HOSPITAL. *Epithelioma of Skin of Nose*.—Mrs. E. P., aged 53, admitted to the house from Gibbsboro, N. J., July 17, 1905, with an ulceration on side of nose near canthus of left eye, of some years' duration. It was 1½ cm. in diameter, and had the characteristic raised edges of rodent cancer. Monopolar application under chloroform, 25



Fig. 26.—Case 234 before treatment, June 26, 1905.

ma. for fifteen minutes. Discharged to dispensary for observation August 11th.

November 26, 1906. Reported at dispensary with a single pearl of recurrence. Minor application.

NO. 219. ONCOLOGIC HOSPITAL. *Lupus of Nose*.—Mrs. E. H. S., aged 72, was admitted to dispensary August 28, 1905, with a chronic ulcer on the tip of the nose clinically resembling lupus. It had resisted remedial efforts for five years. Minor application of 20 ma. was made for half-hour. Five ma. were applied similarly November 7th, and six ma. No-

vember 28 of same year. Reported at hospital without recurrence in November, 1906.

No. 234. ONCOLOGIC HOSPITAL. *Epitheliomatous Patches on Face and Ears*.—C. H. S., aged 63, applied to dispensary June 26, 1905, with multiple senile epitheliomata on left cheek (Fig. 26), and on the helices of each ear, of two years' duration. Under cocaine a minor application of as much as 40 ma. for 30 minutes was made to the principal growth, and on a subsequent occasion each of the other growths received applica-



Fig. 27.—Case 234 after treatment, September 14, 1905.

tions of 8 ma. for 15 minutes and 3 ma. for 10 minutes. Fig. 27 shows the condition September 14, 1905.

January 10, 1908. In response to letter patient states that there has been a recurrence of the growth on the cheek, but that he is confined to bed with rheumatism and unable to return for further treatment.

No. 243. ONCOLOGIC HOSPITAL. *Recurrent Epithelioma of Scalp*.—Mrs. S. D., aged 50, was referred by Dr. Eckman, of Philadelphia, October 3, 1905, with a proliferating growth on the occiput about 4 cm. in diameter. For 20 years she had had a wen on the site of the growth which she says gave her "no trouble" until one year ago, when it became painful and was opened by a physician. It failed to heal, and was later curetted (in March, 1905). In April it was removed by the knife. She suffered from severe headaches.

October 4, 1905. Major monopolar application, 250 to 300 milliamperes for 65 minutes.

October 21, 1905. Patient discharged with some evidence of disease in wound and no relief of headaches. During November and December the patient received eight minor applications varying from 25 to 45 milliamperes, and ceased attendance owing to weakness.

Word was received several months later of her death.

NO. 256. ONCOLOGIC HOSPITAL. *Small Epithelioma of Bridge of Nose*.—A. McL., aged 70, admitted to dispensary October 30, 1905, with a growth clinically resembling epithelioma and about the size of a pea, on the bridge of nose. Minor application, 6 to 9 ma. for 18 minutes.

February 26, 1906. Reports at dispensary with no evidence of disease.

NO. 85, PRIVATE CASE BOOK. *Multiple Senile Epitheliomata*. J. M. R., aged 77, of Camden, Dela., was referred by Dr. Leonardo Judd, of Philadelphia, December 5, 1905. His father had callosities on hands, and a maternal uncle died of cancer. For 8 or 10 years he has had an epithelial growth with crusts just above the inner canthus of the left eye. He had a similar growth excised five years ago.

The growth is an epithelial ulceration surmounted by a crust, about $1\frac{1}{2}$ by 2 cm. in size. Minor application, 7 ma. for 20 minutes, 4 points.

January 29, 1907. There is a small nodule in scar of previous application. There is also a new growth on the side of cheek about the same size as the one over the eye when first treated. Both spots received a simultaneous minor application of 10 ma. for one hour.

September 13, 1907. Perfect scar at site of growth on cheek. In the scar over left eye 1 milliampere is applied for 20 minutes.

July 18, 1908. Returns with both scars in perfect condition, but with a new growth, the size of a dime, high up on forehead at border of hair. This growth shows distinct evidence of malignancy in a raised base abundantly supplied with vessels. Minor application, 7 ma. for 30 minutes.

August 25, 1908. Slough has separated, showing excellent scar.

No. 307. ONCOLOGIC HOSPITAL. *Epithelioma of Scalp*.—T. J. O., aged 80, applied at dispensary February 5, 1906, with the growth shown in the photograph, Fig. 28. It had appeared eighteen months before, and had given rise to no sensation until within two or three months, when pricking



Fig. 28.—Case 307 before treatment, February 5, 1906.

sensations and itching developed. As the patient was quite feeble it was decided to attempt the removal of the growth without general anesthesia, a bipolar minor application being used to lessen pain. A small negative surface was therefore held against the center of the growth, with patient reclining, and two small needles inserted into it near the base. Eighty milliamperes were gradually turned on and maintained for 45 minutes. After resting the patient went home. A microscopic examination showed the tumor to be an epithelioma.

February 15, 1906. Slough came away. Wound dressed with diluted zinc ointment.

March 15, 1906. Wound healed and showed no evidence of disease.

December 6, 1907. Visits dispensary, showing no evidence of disease. A photograph, Fig. 29, was taken at this time.

No. 328. ONCOLOGIC HOSPITAL. *Rodent Epithelioma of Forehead*.—Mrs. J. S. C., aged 56, was admitted to the dis-



Fig. 29.—Case 307 after one bipolar application. Photograph taken one year and ten months later.

pensary March 29, 1906, with a patch of rodent epithelioma over left eye covering about one-third of forehead, superficial, with several areas that had cicatrized under Dr. Hartzell's treatment. A spot at outer canthus of eye threatens invasion of the orbit.

She was placed under minor cataphoric applications, 4 ma. with 4 needles, and attended dispensary irregularly for 6 months, at end of which time there was but little disease evident, and that attacking outer canthus of eye quite healed over.

February 18, 1908. Patient returns with distinct relapse except at the corner of eye. As the x-ray had not been tried on this case, she was referred to Dr. Newcomet.

No. 42. ONCOLOGIC HOSPITAL. *Rodent Epithelioma of Face, Recurrent.*—Mrs. Z. R., aged 50, was referred by Dr. Addinell Hewson, May 5, 1906. The patient had been admitted to the hospital one year before and the disease, then recurrent, had been excised. It had existed three years before admission to Dr. Hewson's service, and had resisted various methods of treatment. X-ray treatment had been used for a time after excision.

On date above mentioned a major monopolar application of 200 ma. was made under general anesthesia. Some nodules of disease remaining after healing, the patient was placed under minor cataphoric treatment in the dispensary, from 1 to 3 ma. each, varied by three re-admissions to the hospital for major applications varying in strength from 25 to 100 ma. Patient still under observation and occasional treatment.

No. 347. ONCOLOGIC HOSPITAL. *Epithelioma of Cheek.*—Jas. O'D., aged 70, was admitted July 10, 1906, with the large fungating growth shown in Fig. 30. The growth began six



Fig. 30.—Case 347 before treatment. July 10, 1906.

years before, and has rapidly grown during the past year, in spite of x-ray treatment persistently applied for nine months. Unfavorable prognosis had been given by several prominent surgeons, who declined to operate. The microscopic exami-



Fig. 31.—Case 347 after one major application. Dead bone showing in photograph taken August 23, 1905.



Fig. 32.—Case 347 after separation of bone and final healing. Photograph taken one year and three months after treatment.

nation showed squamous celled epithelioma. The patient's arteries were rigid, and his general condition indicated senile degeneration.

July 11. The patient was placed under general anesthesia and a bipolar major application made of 500 ma. for 50 minutes.

August 21. Minor application of 18 ma. to suspicious spot.

August 23. Discharged from hospital to dispensary, with dead bone showing (Fig. 31).

September 15. Dead bone removed. Edges of wound healthy.

October 22, 1907. Photograph taken (Fig. 32). December 2, 1907, showing no evidence of disease.





Edward C. Titus

President of the American Electro-Therapeutic Association.

Editorial.

THE RELATION OF DIET TO THERAPEUTICS.

ACCURATE methods of comparison in the study of the effects of diet upon hypertension, as revealed by the sphygmomanometer, open up a new aspect in regard to the indication for the correction of food taken as to quantity and quality. It becomes more and more apparent that the regulation of diet in the treatment of nephritis and other conditions associated with arteriosclerosis, and the so-called rheumatic conditions, has had a foundation in fact; though the exact relation as to cause and effect was not appreciated by the early observers.

The conditions of auto-intoxication arising from the inception of such foods as afford a favorable culture medium for the development of intestinal bacteria are capable of inducing conditions of auto-intoxication followed by hypertention or local toxemia, resulting in the various joint and glandular inflammations which have been attributed until recently to the so-called "uric-acid diathesis." The fallacy of the latter hypothesis has been demonstrated in the findings associated with toxic infection, and the theory which was so long the accepted notion of the profession and is to-day commonly accepted by the uninformed lay members of the community must give way to the disclosures of the later scientific researches. With these observations it is apparent that the systematic regulation of diet, as indicated in case of a demonstrated rise of arterial tension, or as a prophylactic procedure before marked changes in arterial tension occur, is a subject of great importance to humanity.

The habit of excessive indulgence in red meats or excess of other albuminoid foods is a serious matter for consideration from the point of view of what follows. Arteriosclerosis is one of the greatest scourges of mankind, and its cause in relation to diet one of the most important subjects engaging the professional mind.

The employment of the lactic acid ferments, in accordance with the researches of Metchnikoff and Coomes, has awakened an interest in the employment of such foods as will serve

the purpose of intestinal antiseptics, acting as antagonists to the bacilli, which constitute the infection which leads to toxemia as associated with arteriosclerosis and the so-called "rheumatic" affections. The study of this subject is one that engages the profession as never before, now that the importance of the relation of diet to toxemia and its consequences has been demonstrated.

* * *

RADIANT HEAT VS. CONVECTIVE HEAT.

A SUBJECT which is overlooked by many in the consideration of the therapeutics of heat is the fact that when convective heat is employed the blood is heated and rapidly conveyed onwards, a normal temperature blood stream replacing the blood that has been heated, thereby preventing extension of heat effects beneath the superficial structures. With radiant heat the effect is quite different, radiant energy not becoming heat energy until it has been converted by contact with the tissues. In other words, radiant light as it passes through the atmosphere and other transparent bodies, when it passes through glass, is not converted into heat units until it is absorbed by some body upon which it falls. The depth to which heat is thus produced is relative to the volume and penetration of the radiations employed.

* * *

THE NINTH ANNUAL MEETING OF THE AMERICAN ROENTGEN RAY SOCIETY.

THE Ninth Annual Meeting of the American Roentgen Ray Society will be held in New York, on December 28, 29, 30, 1908.

The Scientific Session and the Exhibit of Prints and Negatives will be held in the New York Academy of Medicine on 43d Street, between 5th and 6th Avenues.

The Manufacturers Exhibit will be held in the Engineers' Societies' Building on 39th Street between 5th and 6th Avenues, which will comprise a profusion of coils, tubes, apparatus, radiographic tables, apparatus for stereopic-radiotherapy, localization, etc.

The official headquarters during the session will be at the Murray Hill Hotel, Park Avenue and 40th Street, near the Grand Central station, where very favorable rates have been arranged for.

An excellent programme is in preparation, and all members of the profession who can, should avail themselves of the opportunity to attend the sessions.

Progress in Physical Therapeutics.

GYNECOLOGY AND METALLIC ELECTROLYSIS.

EDITED BY G. BETTON MASSEY, M.D.

Cataphoresis. Under the above heading Dr. Mark W. Peyser (Virginia Medical Semi-Monthly) makes the following remarks, *inter alia*, after reviewing briefly the chief factors in electrolysis and phoresis and referring to the congestion produced at the negative pole of the constant current, whether surgical, as when needles are employed, or medical, when wet pads of cotton, sponge, or clay are used.

"I have about come to the conclusion that much of the beneficial effect of negative galvanism is due to the hyperemia it produces. This being so, it might be used throughout the entire treatment of some of the diseases to be mentioned later.

"Metallic electrolysis, the name sometimes applied to cataphoresis, is a misnomer, because there is no decomposition of metal, merely a propulsion of its ions. Neither should the term cataphoresis be applied exclusively, but rather phoresis, which includes both it and anaphoresis." [Still better terms are ionic medication or ionic surgery.—Ed.] "The metals used in the phoresis of metallic electrodes are mercury, zinc, copper, and tin, mercury being employed in the form of an amalgam with the other metals, or with gold. This process possesses bactericidal properties in addition to those mentioned in discussing electrolysis; and the ions are propelled for some distance into the tissues dependent upon the electromotive force, quantity of current, time of application, size of electrode, and amount exposed, area and nature of tissue, etc.

"The diffusion of metals is one of the most valuable agents in the possession of the electrotherapist; and the process has been so far developed that Massey and others now employ it in the treatment of cancer and other tumors to the almost total exclusion of other recognized methods. In the treatment of cancer of the breast, Massey uses amalgamated gold electrodes, the mercury leaving the gold, which is but little, if any, attacked, and radiating in dark lines, through the growth toward the opposite pole. In some instances, he uses amalgamated zinc electrodes."

Hear his conclusions: "1. Massive diffusion of nascent mercury salts within a growth or cavity by electrification, constitutes a novel therapeutic procedure of great value in the de-

struction of foci of malignant or non-malignant growths, when the growths are so situated as to allow penetration and drainage. 2. Phoric destruction of the germs of primary cancerous growth in situ, including outlying colonies and so-called roots of prolongation, permits preservation of unaffected portions of the organ or situation; and offers greater security against recurrence than efforts to remove living malignant growths by cutting operations. 3. While the phoric method may be employed as palliative in non-operative malignant growths and may, at times, cure, its chief value is in the total destruction of malignant germs in the early stages of primary growth, and in the same stages of purely local recurrences."

[Zinc-mercury electrodes are now used exclusively instead of the gold-mercury instruments in all genuinely malignant growths irrespective of situation, for the reason that experience has demonstrated that the association of zinc ions with the mercury ions gave more efficient results.—Ed.]

"Phoresis is of special value in genito-urinary and gynecologic work. I have in mind the case of a young man who had gone through the hands of several physicians here and elsewhere. His condition had been diagnosed as tuberculosis by one, and as diabetes mellitus by another, because of wasting. Careful examinations eliminated these. His chief complaint was of pain in the occiput and back of the neck. Saying that he was strictured, an examination was made and three were found, the last and smallest being in the prostatic portion and admitting only a 10 F. sound. In addition, there was a false passage and a condition of marked hypersensitiveness. I proposed using electrolysis for the cure of strictures, but the pain was so great that the first treatment had to be discontinued before completion. When he returned, several days later, copper diffusion was employed and repeated five days later. Coming for the third treatment, he said that the occipital and neck pain had entirely disappeared. It did not return; and whether as a result or a coincidence, he began to take on weight until he attained his normal. Hypersensitiveness having been overcome after several sittings, I essayed cure of the strictures, but after a number of 14 F. had been passed by electrolysis, he refused further aid on the ground that he was very comfortable. I have seen the patient several times since, and he continues in good health. His condition was evidently one of neurasthenia, due to hypersensitiveness of the posterior urethra. All of us have seen such cases.

"Overall and Neiswanger, of Chicago, claim excellent results in chronic prostatic enlargement from iodine phoresis—the former treating through both the rectum and urethra; the latter through the urethra alone. Possibly, the hyperemia produced at the negative pole has much influence on the result.

"Patients with subinvolution, metritis, endometritis, and erosions of the os are quickly benefited by mercury, copper, or zinc phoresis. Ulcers, fistulæ, and chancroids soon heal under its use; but to name all the diseases in which the method is applicable would be a waste of time, for they would readily suggest themselves if the basic facts are known.

"In conclusion, I would mention some of the advantages of the method: Application of the medicament to the immediate seat of trouble, and in the nascent state; deep penetration in addition to superficial action of agents; avoidance of operation in many instances, and as a negative advantage, the difficulty of application is not greater than that of other measures for the same disease."

RADIOTHERAPY.

EDITED BY J. D. GIBSON, M. D.

X-Rays and Exophthalmic Goiter. By Dr. G. E. Pfahler, Jour. A. M. A., November 7, 1908.

The writer reported results of the x-ray treatment of exophthalmic goiter and says that at least fifty-one cases in which the Roentgen rays were used have been recorded in the literature of this number, and in forty-two cases there were good results; in nine patients there was little or no improvement. He draws the following conclusions. (1) Decided improvement may be expected in about 75 per cent. of cases. (2) This improvement consists of an increase in weight and strength and gradual disappearance of Basedow symptoms. (3) Some improvement should be noticed within a month, and after from six to twelve treatments. (4) When this treatment is properly given there appears to be no danger, and Pfahler can see no objection to recommending this trial of a month in all cases.

Some of the More Unusual Forms of the Epithelial Growth of the Skin. By J. A. Fordyce, M.D., Jour. A. M. A., October 24, 1908.

In this very scientific paper the doctor discusses very thoroughly many forms of epithelial disease, but as of interest to x-ray workers, I will call attention to but one of the cases he reports—"Epithelioma of the Lip of a Woman." This condition is frequent in men but rare in women. The patient, M. S., aged forty-eight, tumor began sixteen years previously in a small lesion near the ala of the nose. It spread very slowly until it involved the vermilion border of the lips.

The ulceration of the left angle of the mouth and adjoining upper lip was so extensive as to expose the bicuspid and canine teeth. The growth yielded to the x-ray. Under the microscope it was seen to be made up of basal cells, with a delicate tubular arrangement, conforming with the rodent ulcer type of growth. He thinks that longer experience with the x-ray treatment of epitheliomas of the skin has led to a much greater conservatism in its recommendation. He has found that better results have been obtained by the rays, after the new growth has been thoroughly curetted. "In this way," he says, "it is possible to apply the rays directly to the more actively developing cells." It has also been his experience that the long use of the ray in malignant cutaneous growths is, as a rule, contraindicated, especially its persistent use, after repeated relapses, for he thinks that in certain cases it renders the tissues more vulnerable to the malignant processes and that the x-ray should be reserved for cases of the internal canthus, the eyelids, and other facial locations where other means are not available.

Preliminary Note on the Treatment of Lupus, by Becquerel Rays. By Boubeyron, Medical and Surgical Progress..

For some time the author has had the idea of treating lupus by the prolonged application of substances feebly radio-active, such as nitrate of uranium and of thorium, pitchblend, etc. The applications are made in direct contact with the tissues. He presents a case of cure of lupus of the size of a five franc piece, cicatrized after thirty days.

The X-Ray in the Treatment of Carcinoma. By S. E. Hunter, M.D., The Clinique.

In this very conservative paper the doctor very likely has made himself a little too conservative, but when it comes to treating carcinoma with the Roentgen ray, we can afford to be very conservative. While claiming to have prolonged life, and in one case that has remained well for eight years, he still considers that the knife should be used in all primary cases, where the growth can be removed thoroughly and well, and this should be followed by x-ray treatment. He uses a tube of medium vacuum, excited by a coil of ten-inch spark-gap capacity; the tube to be so placed that the most powerful rays from the target will fall upon the center of the growth. It should never be placed, he says, closer than twelve inches, and a lead mask should be used for protection of surrounding structures. He controls his exposures by the reaction of the normal tissues.

ORGANOTHERAPY.

EDITED BY I. OGDEN WOODRUFF, M. D.

The Serum Treatment and the Prognosis Under Various Forms of Therapy of Cerebro-Spinal Fever.

Henry Koplik in the Medical Record, October 3, 1908, describes his treatment of cerebro-spinal fever, and discusses the results of that treatment and their comparison with the results obtained when the serum treatment was instituted in addition.

He considers it wise to divide the cases in two classes representing two grades of severity of the disease when attempting to ascertain the value of the serum treatment. These are the sporadic and the epidemic.

Without serum treatment of the sporadic cases occurring between the years of 1899 and 1904 there were 21 with a mortality of 38 per cent.; during the epidemic years of 1904-5, 74 cases, with a mortality of 52 per cent. Excluding the cases under two years of age in which the mortality is always extremely high, the sporadic cases showed a mortality of 13 per cent., the epidemic cases, 31 per cent.

Since the epidemic, of 13 cases treated with serum in addition, the mortality has been 17 per cent. Of cases over one year of age none have died.

In closing he states:

"I think it would be rather premature and unfair in every way to draw any conclusions as to the serum until we have seen a larger material and until we have tried it in an epidemic of the violent type, such as we passed through in 1904 and 1905. On the other hand, it may be said that the serum of Flexner not only makes a very favorable impression, but is certainly a factor which cannot be excluded from the therapy of cerebro-spinal meningitis, no matter what our subsequent conclusions may be. It certainly does appear that with the serum as we perfect it we may have an improvement in the percentage of recoveries. It is hard to say sincerely whether, taking the cases I have treated, I shall continue to have the same good fortune to save all but two cases of thirteen. Even if the cases I have lost were below one year of age, judging from the results obtained elsewhere, we may still meet with cases which we cannot save by the serum, and it would certainly be very unreasonable to expect a continuance of such a very high percentage of recoveries as we have just shown."

Serum Treatment for Dysentery. La Tribune Medicale (1907).

Vaillard and Popter give their experience in 200 cases of dysentery treated with serum. Half of these were very severe

cases. The mortality was 5 per cent. The action of the serum was very rapid, diminishing the number of stools and relieving the tenesmus and colic. Each patient was discharged cured in a few days after its inauguration.

Report of Six Cases of Gonococcic Arthritis Treated with Anti-Gonococcic Serum.

Perez-Miro in the *Therapeutic Gazette* gives the histories of six cases and his conclusions as to the effect of the use of the serum. The serum was given in addition to other well recognized methods of treatment.

It seemed to him:

(1) It relieved articular and testicular inflammation more promptly and effectively than other methods of treatment.

(2) It materially aids in various other methods of medication.

(3) It frequently causes a temporary increase in the urethral discharge.

(4) The injection is free from pain and produces at most and but rarely a slight hyperemia around the point of injection.

Moser's Serum as a Therapeutic Agent in Scarlet Fever.

Egis and Langovoy (*Jahrbuch für Kindeheilkunde*, 1907) give the following results of their investigations with this serum in the scarlet fever pavilions of the children's hospitals in Moscow: In severe cases the mortality is reduced from 47 per cent. to 16 per cent.

The action of the serum is antitoxic.

In order to obtain the best results the serum should be injected during the first three days of the disease.

The effect of the serum is to cause a fall in the temperature, the abruptness of which fall is in direct proportion to the earliness of the injection.

The presence of complications tends to cause the temperature to fall more slowly.

Complications are practically uninfluenced by serum treatment.

The dose required is very large, 100 to 200 cc. being required for each injection.

On account of the size of the dose serum complications are frequent, and also for the same reason are proportionately grave.

The efficiency of the serum varies considerably with the individual horse from which it is obtained.

SOCIETY MEETINGS.

**AMERICAN ELECTRO-THERAPEUTIC
ASSOCIATION.**

EIGHTEENTH ANNUAL MEETING.

(Continued from page 602.)

Afternoon Session.

**REPORT OF COMMITTEE ON CONSTANT CURRENT; ITS PHYSICAL
PROPERTIES AND PHYSIOLOGICAL ACTION.**

Margaret A. Cleaves, M.D., Chairman.

There is nothing new or fundamental to note in a consideration of this, the fundamental electrical force. The late Dr. Herdman, a former, and valued chairman of this Committee for many years, voiced the opinion a few years since that, as an association, we were selling our birthright for a mess of pottage, because of our neglect and ignorance of this fundamental current and our seeking after spectacular effects, which was felt at the time to be a very strong, and perhaps unjust, criticism, but your Committee are of the opinion that it was not.

In the opinion of your Committee the constant current is not only the parent of all electrical forces, but is the most important of them all in the field of medicine and surgery. Your chairman is at one with a member of this Committee who asks: "What is the attitude of the average operator in the field of electrotherapy to-day?" With inspirations borne on the wings of fancy and fatuous ambition, he has stripped the mask from the face of ethical decency, and with loud trumpetings and psychological—aye mythical—machinations, he plays to the gallery in the commercial drama of life. It is a deplorable fact that we have, in the field of electro-therapy, operators whose offices are equipped with such an array of spectacular machinery that they find it difficult to determine just what manifestation of energy to use in any given case. They reach a sedative ease of conscience, however, by applying that part of their voluminous outfit which happens to be idle at that particular time, thus typifying the wonted charlatan whose malign influence has often relegated a power for good to the background.

This is in no sense an unjust criticism, nor does it for one moment depreciate the value of the currents from high-frequency apparatus and static machines.

It is the opinion of your Committee that the constant current by reason of its physical properties, and physiological action is of inestimable value in relieving congestions, in stimulating

the circulation, in improving defective nutrition of muscles and nerves, and in the absorption of exudates. This opinion, in so far as your chairman is concerned, is not given from experience with the constant current only, but is the result of the daily use, extending over a period of from fifteen to twenty-three years (the constant current having been used for the longer period and the electric arc for the shorter) with a constant-current equipment, two static machines, a sinusoidal apparatus, an induction coil, an x-ray and high-frequency apparatus, the electric arc of from 10 to 80 amperes, incandescent-light cabinets, the leucodescent lamp, and radium since its discovery.

It is the consensus of opinion of your Committee that no office equipment is complete without the constant current, while any office may be regarded as complete, if it have only a constant-current equipment. This is a strong statement, but an experience from its use in the entire range of pathological physiology, as well as anatomic lesions extending over many years, renders it but a statement of simple truth.

The effects which concern the physician most are (1) physiological and (2) chemical. It is possible that there are physiological effects due to the nervous stimulus, which can be distinguished ideally, at least, from those due to direct chemical or physical action. Long since, however, the opinion was expressed by DuBois-Reymond that excitation with the constant-current was nothing more than the first stage of electrolysis in excitable tissue, and the consensus of opinion to-day is that this is the correct definition of the physiological action of the current. A consideration of the chemical effects of the current, therefore, precedes that of the physiological.

There are four ways in which electrolysis can affect, in the living body, such tissue as muscle by its chemicophysical action: (1) By the chemical effects of the products liberated at the electrodes or in the substances of the tissues; (2) by the removal of electrolytes, chiefly inorganic substances which are necessary for the vitality of the tissues, leading to increased absorption of the elements, and, perhaps, in consequence, to increased activity of the general nutrition in the tissue, or if the action be more intense, to diminished vitality, degeneration, and death; (3) by cataphoresis, leading to increase of transferred substances around the cathode, and diminution around the anode and the consequent increase of eliminating or absorbing activity, by which a tissue returns to healthy equilibrium, or to any of the results which follow the disturbance of equilibrium beyond the limits of health; (4) by raising the local temperature in both cases, but the physiological change may be very different.*

* "On Electrolysis of Animal Tissues," G. N. Stewart, Studies from Physiological Laboratory, Owens College, Manchester, England. ‡

So far as it is at present known, no current can pass through such a mass of materials as that of which the human body is composed without effecting electrolytic decomposition, or, in other words, the only medium of conduction in such a mass is chemical decomposition or electrolysis. It does not matter whether it is a constant or an alternating current, electrolytic effects are produced only in the medium immediately surrounding the poles or electrodes, but also in the intrapolar or intervening tract. But with all forms of alternating electromotive forces, whether of low or high frequency and static electricity as well, little, if any, accumulation of electrolytic material takes place at the poles. It is true that the electromotive force produced by the static machine tends to the production of a continuous current, but to decompose a single drop of water by this means requires an expenditure of energy totally at variance with the amount of chemical work done; while the very small, comparatively speaking, electromotive force of a series of chemical generators or a constant-current dynamo causes this chemical action instantaneously with an accumulation of its products at the poles. A high-frequency current causes the body to be traversed by currents of great amperage without sensation, but here again there is no polar action as with the constant current. The latter energy judiciously expended will do the work of the former, but an expenditure of the energy of high-potential and high-frequency currents will not produce the chemicophysical effects of the constant current, characterized as it is by polar action, *i.e.*, the accumulation of the products of electrolysis at the poles, and upon this property therapeutic indications are based. Profound chemical changes are established which may result in the death of the tissue, as, for example, in the puncture of a mole. Here the current is turned on gradually. There are no muscular contractions, but in a few moments' application there is complete destruction of the growth by the chemical action of the current, and the resulting interference with the circulation.

The action of the physical effects of the current may be formulated as follows: Electrolysis chemically and cataphoresis mechanically alters the amount and distribution of salts necessary to the proper nutrition and function of the various parts of the living organism. By the latter there is a direct transference of the fluids and salts by way of the cell walls, muscle septa, coats of blood vessels, sheaths of nerves, skin, serous and mucous membranes, in fact, all animal membranes which from the physical point of view are all the very best kind of porous diaphragms. Primarily this action takes place throughout the tissues interposed between the electrodes (not necessarily the nearest way, but along the path of best conduction), but secondarily its influence is felt beyond the interpolar region. Just as it is impossible for a local hemorrhage to exist without

its influence being felt beyond the immediate site of the hemorrhage, just so it is impossible to drain a part cataphorically without the influence extending, even to the entire organism.

This physical effect may be carried to the extent of completely cutting off the blood supply, thereby causing immediate and actual destruction (electrolysis of a mole); or by interfering with it to such an extent that there is no channel left by which the inorganic constituents and proteid nutriment can be conveyed to the part with which to feed it, and death from starvation ensues (absorption of an organized inflammatory exudate or an intramural uterine fibroid); or, in lesser degree, only the normal ionization and osmotic action characteristic of living tissue and necessary to nutrition and normal function. In this latter instance the same physical effects of the current result in a stimulation of normal chemicophysiological processes, *i.e.*, the movement from ion to ion throughout the inter-polar circuit, the bodily transfer of complete neutral molecules, and the normal non-electric osmosis. By this action nutritive changes are initiated and, by a sufficiently frequent repetition of the use of the current, are subsequently fully established. The one condition or the other will obtain according to the quantity of the current and the manner of its use, that is, whether a strong or a mild current is used, and whether the application is characterized by current distribution or current density. The use of a strong current of short duration, characterized by a current density, has either an intense irritant or else a destructive action whereas the same current, if characterized by current distribution, will produce an entirely different effect, because by reason of the increased electrode contact (square-inch area), the energy expended in each square inch of surface is diminished in proportion to that increase.

A mild current, if long continued, will cause a profound change in the amount of fluids and salts in a part, and in this physical fact is to be found the therapeutic indication in pathological states, whether characterized by a diminished or altered blood supply, under nutritive activity, pelvic exudates, a benign degenerative process, or by an excess of fluids, as in a subacute articular rheumatism, for example.

In considering the physical properties and physiological action of the constant current, that therapeutic indication may be definitely determined, the salient physical feature in contradistinction to other currents must never be lost sight of, namely, polar action. In this lies the secret of its value over and above all other manifestations of electrical energy, whether in pathological physiology or recognized pathological anatomy.

There is to be had in the constant current a current operating at low pressure and small amperage, which, even in the minutest dose, cannot be used without polar action. A milliampere of current will decompose a single drop of water instantaneously

with characteristic anodic and cathodic movement of the ions.

While there is an interlocking of effect from the action of the various physiological stimuli, it is necessary for the securing of results to recognize their advantages and limitations.

All electrical measures, in common with other physiological stimuli, tend to initiate, stimulate, and establish cell-metabolism, and in so doing to assist in the restoration of physiological conditions. The constant current possesses the physical advantage referred to by reason of its electrolytic and cataphoric action upon living tissue with the transference of ions, and the stimulation of molecular, osmotic, and electrical processes. In this way the abolishment or control of deep-seated and well-organized pathological conditions is secured. At the cathode there results a profound hyperemia with a local excess of the ions of hydrogen, sodium, potassium, ammonium, and calcium. On the contrary the anodic area is deprived of its hydrogen ions, as well as the ions of the bases just enumerated, while an excess of oxygen and chloric ions is secured.

Every therapeutic application is based upon the action at the poles, as per the following table:

Cathode, *i.e.*, Negative—

(A) Physiological—Stimulating.

(B) Physio-chemical: Accumulation of the positively-charged ions of hydrogen, sodium, potassium, calcium, and ammonium.

Formation of an alkaline caustic, *i.e.*, the hydrates of sodium, potassium, calcium, and ammonium.

Production of a soft, retractile eschar.

Cataphoric: Accumulation of fluid and basic ions.

With mild currents nutrition promoted; with high currents denutritive effect.

Anaphoric: Ability to diffuse the positive ions of certain chemicals, as eosin.

Antiseptic, moderately. First effect of current, ischemia; second, hyperemia; ultimate effect, equalization of circulatory conditions.

Anode, *i.e.*, Positive—

Physiological—Sedative.

Physio-chemical: Accumulation of the negatively-charged ions of oxygen and chlorine.

Formation of an acid caustic, *i.e.*, sulphuric, hydrochloric, nitric, and phosphoric acids.

Cataphoric: Loss of hydrogen and basic ions; loss of fluid; coagulation.

Starvation of tissues.

Production of a dry, hard, and non-retractile eschar.

Diffusion of ions of oxidizable metal electrodes or of ionized solutions.

Antiseptic: First effect of current ischemia; second, hyperemia; but much less marked than at negative pole.

By reason of this physio-chemical polar action, it may be readily seen that the physiological action is both sedative and stimulating, sedative resulting from contact with positive pole because of the cataphoric transfer of the ions of hydrogen and the bases from the region of positive polar contact to and towards that of negative contact, and stimulating at the negative by the increase in that region of fluid and positively-charged ions, which mean at once a hyperemia. By reason of this increased blood supply, stimulating and ultimately nutritional effects follow.

The characteristic action of the positive pole in relation to circulation is one of vasomotor constriction and of the negative one of vasomotor dilation. Both poles, however, as has been stated, produce an ischemia, and both a hyperemia.

As a result of anodic polar action, arteries and capillaries are constricted, and in this way hemorrhages are controlled. This control is largely due to cataphoric transfer of the fluids from the region of the anode. The opposite effect, or a dilatation of vessels, is secured at the negative pole by reason of the bodily transfer of fluids from the anodic area to the cathodic area. By the action thus secured at the negative pole masses of exudates or the structure of a fibroid tumor are softened and ultimately removed by the characteristic chemical action of cells.

The intensity of polar action is directly at electrode contact, although it extends into the region beyond to lesser or greater extent, according to the character of electrode contact, the dose, and length of application.

In other words, applications are characterized by current density, or current distribution, according to the needs of the case. Current density is characterized by the use of a small, active electrode, as in intra-uterine applications, while current distribution is characterized by a large, active electrode, as, for example, in a vaginal hydro-electric application. In either event, the indifferent contact requires a square inch area proportional to the size of the anatomical part upon which it is placed, and the degree of polar action required.

For purposes of general stimulation, especially when interrupted, the constant current exceeds in value the current from an induction coil. Unlike other currents, it has, so to speak, a selective action upon unstriated muscular tissue, and it is then of great value as a stimulant to the muscular structure of, for example, the uterus, intestines, and stomach. It is of value in practically all pathological-physiology, as well as many anatomic lesions of long standing, and is much more profound and far-reaching in its effects than currents without polar action.

Your Committee find it of value in the various manifestations of cell-metabolism, or lack of chemical control, usually ex-

pressed in the following terms: rheumatism, neuralgia, lumbago, gout, headache, gastric dilatation, neurasthenia, neuritis, all forms of paralysis (especially with a slow interruption), tonsillitis, ulcers of long standing, effusions (pleuritic or synovial), fibroid tumors (80 per cent. given by one member), goitres (nearly all, in the statistics of one member), from 20 to 25 per cent. of malignant neoplasms (according to one member), in developing and exercising weak muscles, in growths of all kinds, and for epilation.

It is the current *par excellence* for the securing of results in anterior poliomyelitis or infantile paralysis, is of value in tabes dorsalis, and exceeds in value other forms of electrical energy in conservative gynecology. In the hands of your chairman, it is in daily use for all relaxed and atonic pelvic conditions, displacements, chronic catarrhal, specific inflammations of vaginal, uterine, and tubal mucous membranes, in sterility, as well as fibroid tumors, and as an adjunct to the care of uterine cancer, as well as in functional and organic nerve conditions.

By reason of its polar action, the constant current stands alone as a diagnostic agent in degenerative nerve conditions.

Conclusion.

Therapy has been based for many years upon the findings of pathological anatomy. This begs the question. The therapist's best guide is the study of pathological physiology. The morbid entity or disease is not a consequence of the lesion. A phase of functional troubles precedes the establishment of anatomic lesions, for example, in blood vessels, viscera, and in the structure of nerves and muscles. In antero-sclerosis and its accompaniments, the sclerotic stage is preceded by one of presclerosis when no lesion exists. The same is true in chronic inflammatory and degenerative conditions of the viscera, in valvular disease, angina, apoplexy, and above all, in that common condition, with an unrecognized pathology, but which evidences a definite pathological physiology, neurasthenia.

There are clearly-defined and readily recognized symptoms due to the absorption of toxins before the development of a neuritis, rheumatism, gout, kidney changes, or a cerebral irritability, for example, which point the way to the best that physiological therapy affords, as well as the best hygiene and sanitation.

The constant current is not only rationally indicated in all conditions of pathological physiology with a direct and definite value therein, but it is also of great value in the anatomic lesion dependent thereon. In common, however, with all therapy, results are more promptly obtained by treating the disturbed physiological condition before organic changes have taken place.

Failure to secure result from other forms of electrical stimuli or from an administration of radiant energy, will, in the majority of instances, follow upon a careful discriminating expenditure of the chemical energy of the constant current.

Respectfully submitted,

MARGARET A. CLEAVES, M.D., Chairman; FRANCIS B. BISHOP, M.D., F. H. MORSE, M.D., W. W. EATON, M.D., ROGER S. YORK, M.D.

616 Madison Avenue,

New York.

Dr. Morris Weil Brinkmann of New York said that the reader of the paper was to be commended for the very concise and accurate manner that she had presented the subject; this would require but very little revising in the future unless new fields were opened for the use of this current.

Dr. Francis B. Bishop of Washington, D. C., congratulated Dr. Cleaves upon her report. He said that as a member of that Committee he gave no assistance, and he was sorry now that he did not. He moved that the report be accepted and placed on file. Seconded.—(*Carried.*)

REPORT OF THE COMMITTEE ON ELECTRO-CHEMICAL SURGERY FOR 1908.

Dr. G. Betton Massey, Chairman.

Electro-chemical surgery may be defined practically as the local application of chemical energy, developed by means of a direct electric current, to the cure of disease by the immediate transformation of the diseased structure into its inorganic elements. Unlike the medical employment of direct currents, which, while producing definite amounts of electrolytic decomposition of tissue, yet depend for their effects largely on the physiologic reaction of tissues to this disturbance of their chemical balance, the surgical effects depend on that form of removal of diseased tissue which results from their immediate transformation into non-living chemical elements.

An apt illustration of the difference between the surgical removal of diseased structure by excision with the knife or other cutting instrument and the surgical removal by electro-chemistry of the same tissue, is found in the difference between the production of a current impulse in a closed coil by a permanent magnet and an electro-magnet. To produce this impulse by the permanent magnet the magnet must be thrust from a distance into the coil and as quickly withdrawn; unless it is physically thrust into the coil and physically removed from it, there will be no impulses. The physical removal of the permanent magnet may be likened to the cutting out of the disease by the knife. The electro-chemical removal of the

diseased cells, on the contrary, is like the production of an impulse in a coil by the disappearance of magnetism in a stationary core. A transformation of the molecules of the iron core produces an effect equal to their physical removal into space. Just as the inert iron then lies in the currentless coil, totally devoid of magnetic qualities, so the transformed disease cells lie in the wound as inert chemicals after their disassociations and re-combinations produced by the current. The necessity for the physiologic separation from the body of the inorganic chemical *débris* thus formed is the chief disadvantage of this form of surgery as compared with excision.

The analogy between the two methods of removing a magnetic core from a coil and the two methods of removing diseased cells from the body may be carried further, by the showing that in practical application both methods have their special indications in both current production and in surgery. As the permanent magnet has its useful field in some instruments, so the knife has its indications in surgery; and as the electro-magnet has been found most effective in some instruments, so, we may affirm, it will be found that electro-chemistry has its special field of usefulness in the removal of diseased structure.

Turning from illustration by analogy to a consideration of the actual facts that indicate a place for electro-chemistry in surgery, it is probable that the chief indication for the use of electro-chemistry in the removal of diseased structure resides in the extraneous life forces responsible for tumors and other disease nodes; in other words, the germ origin of the neoplasms and infection nodes. To physically remove these by a cutting process the incision must be made beyond all tissues containing the germs, and, moreover, in some of them the excised tissue and the cutting instrument must be so handled in the process that no loosened germs or cells may come in contact with the cut surface, else re-growth will occur. To physically remove such growth by electro-chemistry all that is necessary is the chemical transformation of the living germs themselves into inorganic elements, when nature will by absorption remove the framework in which they dwell, which, as a rule, is a mere product of their presence. It is more usual, however, for the framework holding the diseased cells to suffer decomposition also in part, the whole being subsequently thrown off by the formation of a line of demarcation. The important point is that the disease cells, or germs, are killed in situ by transformation into inorganic elements, and that all possibility of operative re-implantation is negatived. A second point is that the cosmetic result is better, for the actual removal of tissue may be more nearly confined to the diseased cells alone.

This principle of electro-surgery: the devitalization of the

cell parenchyma of tumors and infection nodes, is, therefore, seen to be a most important reason for its usefulness, whether we are dealing with a tiny wart, a fleshy mole, a tubercular gland, or a cancer.

We must reiterate, of course, the fact that both excision and electro-chemistry have their indications in different affections, and even in different cases of the same disease. We are merely giving in this place a logical explanation of the principles underlying the choice of the electro-chemical method.

The further development of these principles will show that electro-chemical surgery is at present divisible into two essentially different processes: electrolytic surgery and phoretic surgery.

Electrolytic Surgery.

The older form of electro-chemical surgery was confined entirely to the transformation of organized tissue into inorganic compounds or atoms by electrolysis, without the addition of extraneous substances, and this method still remains a most important one in the treatment of certain benign neoplasms of the skin. Unattackable electrodes are essential when the positive pole is active, though it should be remembered that aluminum is attacked by the alkaline cations at the negative pole, and this metal should therefore not be used in this situation. A voluminous literature belonged to this form of electro-chemical surgery in the third quarter of the nineteenth century, reaching its height in the publication of a work devoted entirely to it by W. E. Stevenson, of London. The absence of exact meters, or even of a unit of measurement in those days, doubtless hindered its development, and progress in this line has slumbered in our own days by the diversion of attention to newer modalities and by the continued absence of reliable meters in physicians' offices and in the hospitals. The subject is, nevertheless, of considerable interest in minor surgery, particularly in the correction of blemishes from the overgrowth of certain parts and appendages of the skin.

This work is almost entirely confined to the negative pole, for the reason that the products of the decomposition of living tissues that appear at this pole, being alkaline, are less caustic and more soluble than the acid products at the positive pole, and therefore produce less scarring.

In the practical technic of electrolytic surgery we believe that better results can be obtained by adhesion to the principle enunciated above, namely: that electrolytic decomposition of the parenchymal cells only—those that are peculiar to the neoplasm—is the essence of this work; and that if the work is so confined it is possible for the parts to be restored to their normal condition without scarring of any kind. In the full

application of this principle of action we are, however, met by pathologic uncertainties. Who can tell, for instance, the true nature of a fleshy mole? Unna tells us they are "embryonic depositions of epithelia in the upper part of the cutis, which, by loss of their epithelial fibrillation, have lost their stiffness." Such meaningless jargon will doubtless disappear some day like the mist before the morning sunlight when we really know the reason for these disfiguring lumps. In the meantime, whether they are embryonic tissue nests in unruly growth, according to the theory of Connheim, or, as is more probably the case, irritation nests of germ life, like nutgalls, the essential part is the cellular tissue of the redundant papillæ, and there is no reason to bring the normal dermic base under the destructive action of electrolysis.

Practically all of these neoplasms are derived from the corium, just beneath the horny layer of the cuticle and not from the true derm. The proper technic is the selection of a very fine, flat, curved needle, such as may be found in any selection of surgeon's needles, to be inserted into the regular needle holder supplied by dealers (which needle holder, however, should not have a circuit-breaking attachment, as a metallic break is extremely unpleasant to the patient). The needle, thus mounted and supplied with a conductor for the current from the negative pole of the apparatus, is inserted into the base of the mole *parallel with the skin surface* and just above the latter, and as the one-half to two milliamperes of current begins to liquefy the exuberant tissue the point of the needle is gently and slowly moved sideways and back and forth, without breaking the circuit, thus confining the destructive action to the hypertrophied elements to the corium alone, and protecting the derm from the destruction that would result from keeping the needle too long in one spot. Practical experience and the assistance of a magnifying glass will determine the exact time for the cessation of the current. The resulting scab will take less time to come away than when the derm has been destroyed and, though a red spot will persist for a time, no permanent scar will result.

In colored moles or nevi the pigment-bearing cells of the corium must be completely destroyed or the color will reappear and the result will tend to produce a more permanent scar than is necessary with the non-pigmented mole though far less evident than the original deformity. There is added reason for the use of the negative pole in a pigmented mole, for the base of the color being probably iron, or some similar element, the color itself is precipitated against the negative needle, some of the iron probably uniting with the needle; but the greater portion of the color may be washed out of the hydrogen bubbles that form, discoloring pledgets of cotton if the mole be of any considerable size. Should the patient be a child it

of the organism are likewise considered, both from the normal ferments and the action of ingesta, particularly the sour-milk ferments which are receiving so much attention at the present time.

This work will be very highly appreciated by the student and physician, who should be informed on these subjects, no subject at the present time demanding greater consideration from the therapist than the subject of dietetics as applied to therapeutics. We recommend the work as one of the best, if not the best, of its kind on the market. The work contains upwards of 450 pages and numerous illustrations and charts. It is printed on good paper and well bound.

HIGH-FREQUENCY CURRENTS. By FREDERICK FINCH STRONG, M.D., Instructor in Electro-Therapeutics at Tufts College Medical School, Boston. With 183 illustrations in the text. New York: Rebman & Company, 1123 Broadway. Price, cloth, \$3.00.

In this work the writer has devoted himself exhaustively to the consideration of all types of high potential high frequency currents and apparatus. Historically he has covered the range of past and present high frequency devices, and opinions of numerous writers on the subject, devoting a great deal of space to the author's own devices for the production of Tesla currents, to which he gives a preference as a therapeutic means of producing the various effects which he believes to be the most valuable in the treatment of diseased conditions. The treatment of the physics of the subject is graphic and scientific. To these subjects he devotes over one-half of the work, of upwards of 280 pages. On the subject of Technic, the writer is profuse in the discussion of various ways of applying high frequency and Tesla currents, devoting about fifty pages of the work to therapeutics. His consideration of the static currents and static effects is very meager. He gives ten pages to the consideration of these currents under the head of Oscillatory Currents. He entirely overlooks the wide range and value of these currents in therapeutics; and on page 92, in which he considers the static currents in connection with static high frequency apparatus he states "that while valuable in the treatment of skin diseases, they are less efficient in the treatment of constitutional ailments involving depleted nervous energy and poor circulation, while the currents of the writer's apparatus are especially adapted to the treatment of the latter conditions." No greater error can be made in the consideration of electrical currents than such a statement; the various currents from the modern high power static machines surpassing in the induction of general functional activity all other apparatus manufactured to the present time.

Another serious omission in therapeutic technic and therapeutics is the employment of the high frequency currents in the treatment of arterio-sclerosis. In therapeutics the work

falls far from all that has been expected from the pen of the author, showing a narrow range of recognition of electro-therapeutic application and indication.

The work is profusely illustrated, and is issued in the publisher's characteristic excellent style.

NEUROLOGICAL AND MENTAL DIAGNOSIS: A MANUAL OF METHODS. By L. PIERCE CLARK, M.D., Senior Attending Physician, Hospital for Nervous Diseases, New York; Visiting Neurologist to the Randall's Island Hospitals and Schools, New York; Consulting Neurologist to the Manhattan State Hospital, N. Y., and the Craig Colony for Epileptics, Sonoma, N.Y.; Assistant Neurologist, Vanderbilt Clinic (Columbia University); Fellow of the American Neurological Association, etc., and A. ROSS DIEFFENDORF, M.D., Lecturer in Psychiatry in Yale University; Assistant Physician and Pathologist, Connecticut Hospital for Insane; Member of the American Neurological Association, of the New York Neurological Association, of the New York Psychiatric Society, and of the American Medico-Psychological Association, etc. New York: The Macmillan Company, 1908. All rights reserved.

This practical volume fills a long-felt need. The thoroughness with which the writers have treated the subjects of neurological diagnosis and examinations will be valuable to both the specialist and general practitioner. Photographic illustrations indicating methods of diagnosis, facial appearances, atropies, motor-points, and the nerve distributions are of a quality unsurpassed in any work on neurology to the present time, indicating a degree of thoroughness and knowledge of technic deserving of commendation. The work should be in general use by the profession. The writers and publishers are to be congratulated on the general features and excellence of this work.

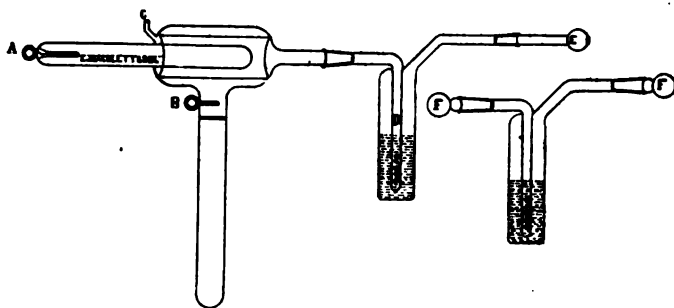
NEW AND IMPROVED APPARATUS.

This department is devoted to publishing, with illustrations, drawings, and descriptions, new apparatus, electrodes, etc., for the benefit of those interested in the progressive improvements in armamentaria.

A NEW OZONE APPARATUS AND INHALER.

A number of apparatus have been manufactured to generate ozone for therapeutic purposes, but in most cases no suitable contrivance has been provided to hold back or collect in solution the forms of nitrous oxide, allowing only the pure ozone to pass through for inhalation. Some of the so-called "ozone generators" consisted of two metal terminals fixed in a glass receptacle with two openings, through which the air enters to be decomposed, and the other for ozone and nitrous acid to pass out for inhalation. When the combined gases are thus inhaled the nitrous acid is irritating to the mucous-membrane, causing severe coughing, the ozone being only a small part of the gases generated, proves ineffectual.

The new apparatus shown in the accompanying cut is constructed identically the same as the large ozone plants for the purification of water. The chamber "A" is an independent vacuum, the same as chamber "B." The air passes through



the orifice "C." The current from the vacuum chambers discharge across the air space, decomposing the air into $N_2 O_2$, $N_2 O_4$, $N_2 O_5$, and O_3 . The gases thus generated pass into the wash bottle attachment containing two parts of oil of pine needles and one part of oil of eucalyptus which absorb the nitrous oxides, allowing the pure ozone to pass through for inhalation.

It is a well-known fact that ozone is a great destroyer of organic life, and a deodorizer. It is a valuable therapeutic agent, provided it can be administered apart from the nitrous oxides.

The only safe and scientific method of separating the two gases is by absorption. When the nitrous oxides pass through the oil they unite and form terepin nitrites and are not acted upon by the ozone.

The apparatus is manufactured and for sale by E. Machlett & Son, 143 and 145 East Twenty-Third Street, New York City.

KNEE BRACE.

The accompanying cut represents a flexible knee brace, consisting of a pair of lateral stays, or supporting members made into coils of nickel-plated helmet bronze spring steel. The inside of each stay is cushioned by a pad of leather, which gives form to the coil and protects the leg.

The coils are held in position by five semi-bands of leather, the upper one makes support for the upper ends of the coils, and strong pressure against the posterior part of the leg; thus leaving the anterior part with Hunter's canal containing the femoral artery and vein free from all pressure.

The second and third semi-bands are attached near the center of the coils and make pressure against the anterior part of the limb just above and below the knee. These bands are



so adjusted that the lateral stays produce no pressure upon the knee.

The two lower bands confine the lower ends of the coils and make pressure against the posterior part of the leg.

The brace when properly fitted is applicable to all knee affections where extension is imperfect. Walking is made easier by the assistance the brace gives in protecting the weakened knee from the entire weight of the body, and at each time the patient raises the affected limb from the ground the brace produces tension on the shortened tendons, ligaments, etc. Thus assisting the extensors of the limb in establishing perfect extension.

Every brace is guaranteed to give satisfaction, if not, the price of the brace (\$10.00) is returned.

Five comparative points that will commend the use of the brace:

1. It is strong but extremely light in weight.
2. Forced extension is easily controlled and an effort to extend the leg perfectly each time it is raised from the ground.
3. Easily adjusted or removed—only two buckles to fasten or unfasten.
4. There is not a girdle to the brace which might interfere with the natural forces, nor is there the least pressure made upon the larger vessels of the limb.
5. Brace is worn beneath the clothing, which relieves the patient of that unsightly apparatus, so often objectionable.

R. R. NORWOOD, M.D., Mineral Wells, Texas.

THE MCINTOSH ASEPTIC HEAD LAMP.

It is constructed along lines assuring greatest possible asepsis, having no unsanitary felt pads or unsightly cloth head band, but a finely nickeled metal brace with a plain leather strip to soften contact with head.

A modern tipless lamp of high efficiency, mounted in a fine polished aluminum reflector, throws a powerful diffused light



free from sharp lines and shadows and may be adjusted at any angle by means of a double ball and socket joint with which it is mounted.

All connections are made inside of the metal shell at back of reflector, avoiding awkward leather casings, while the entire instrument is finely finished and provided with rich silk-covered cord and handy separable plug connecting with any ordinary lamp socket.

Weight on head of metal brace, lamp and reflector is only eight ounces, making it extremely light and comfortable. Manufactured by the McIntosh Battery and Optical Company, 227-229 Washington Street, Chicago.

INDEX.

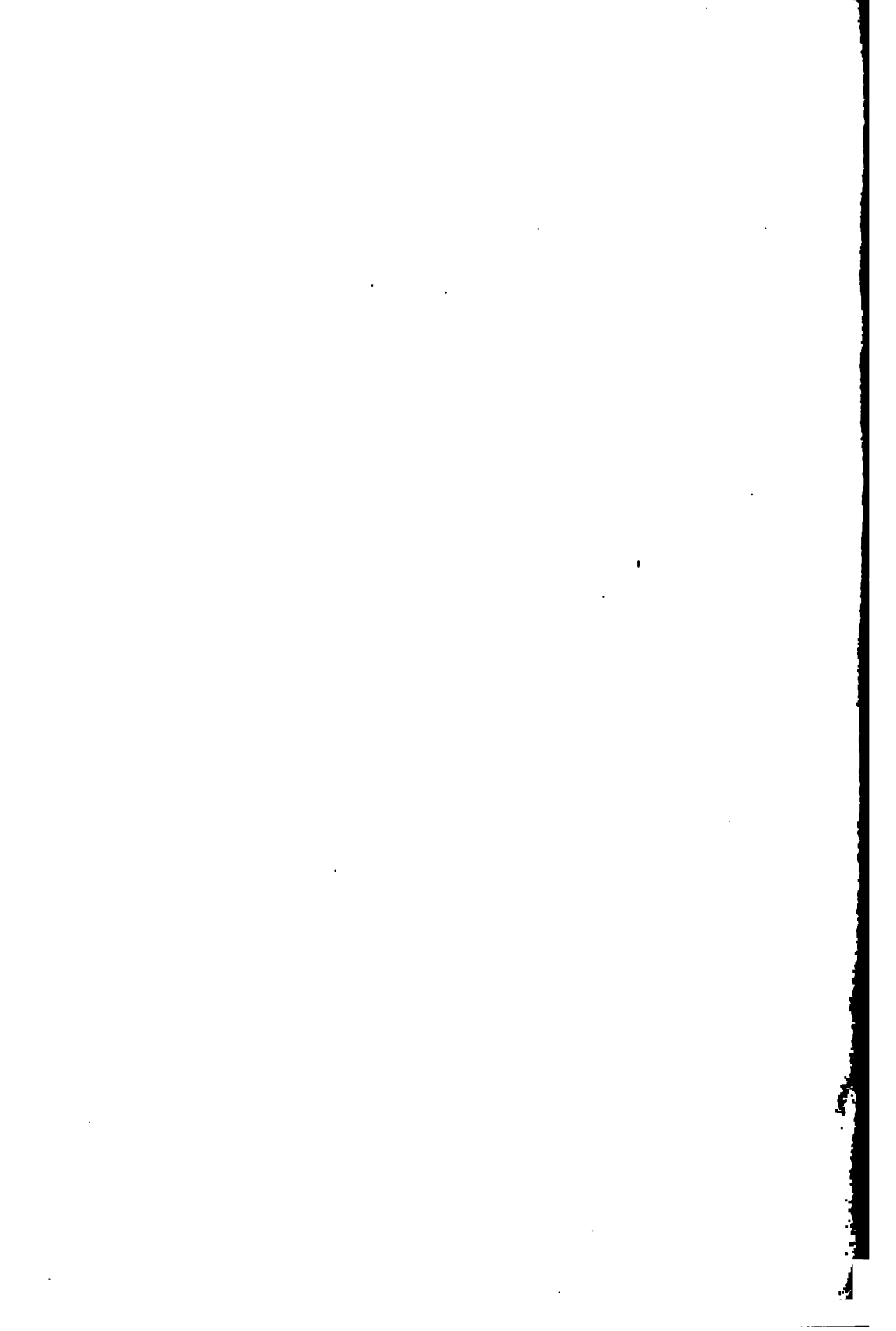
- Acne, 49
and Chronic Eczema, Treatment of, 48
Rosacea, 50
Vulgaris, Treatment of, 271
Active Hyperemia by Hot Air, 377
Advanced Therapeutics of Arthritis Deformans—Progressive Polyarticular. S. J. Wright, 559
Advancement of the American Electro-Therapeutic Association. Herbert F. Pitcher, 493
American Electro-Therapeutic Association, 257, 321, 422, 462, 514, 584, 641
Roentgen Ray Society, 634
Animal Therapy: Its Relation to Immunity in the Treatment of Tuberculosis, 271
Anti-Gonococcic Serum, Clinical Observations in, 478
Arteriosclerosis, Treatment of, 213
Attention to the Interior of the Case of the Static Machine, 256
Attitude of the Neurologists Towards Physical Therapeutics, 460
Award of Honor to Wm. C. Gorgas, 366
Balneotherapy in Affections of the Air Passages, 214
in Complicated Heart Affections and Failing Compensation, 103
in Urinary Affections, 325
Bardwell, F. A.—Removal of Superfluous Hair by the X-ray, 395
Barrett, Felix.—Presentation of a Case of Lupus, Showing the Effects of Treatment by Concentrated White Light, 393
Birdsall, S. T.—High Candle-Power Lamp: Case from Practice, 558
Blood Pressure Indicator, A New, 390
Book Reviews, 163, 224, 490, 543, 653
Brinkmann, M. W.—Disruptive High-Frequency Discharges, by the Reaction Method, as a New and Important Therapeutic Agent, 603
Brockbank, Thomas W.—Light Modalities in the Treatment of Disease, 297
Cancer and Its Treatment by Cataphoric Sterilization, 36, 83, 136, 197, 250, 317, 360, 446, 504, 566, 623
Caused by the X-rays, 209
Cannon, T. Harris.—The Treatment of Various Conditions with Static Electricity and High Potential Currents, 398
Capillary Bronchitis, Treatment of, with Mustard-Water, 152
Cataphoric Operations as Modified by the Topographic Situation of Particular Neoplasms, with Detailed Report of Cases, G. Betton Massey, 566
Chemical Rays the Motors of Life Energy; their Mode of Action and their Therapeutic Uses. Margaret A. Cleaves, 578
Chronic Appendicitis, Treatment of, with High Frequency Currents, 258
Climatotherapy of Tuberculosis; Considered on the Physical rather than Bacillary Grounds. Charles Denison, 346
Cold Affusion in Delirium Tremens, 154
Coley Treatment of Inoperable Sarcoma by the Mixed Toxins of Erysipelas and Bacillus Prodigiousus, 102
Constipation, The Study of, by Means of the X-Ray, 368
Credit to Whom Credit is due, 255
D'Arsonvalization in the Treatment of High Arterial Tension, 206
Davis, Frank A.—Vibration, 29
Denison, Charles.—The Climato-

- therapy of Tuberculosis; Considered on the Physical rather than Bacillary Grounds, 346
- Deutschmann's Serum Against Infectious Diseases, 52
- Diagnosis of Pulmonary Tuberculosis by X-Ray, 582
- of Tuberculosis in Children, 101
- Dieffenbach, William H.—Differential Diagnosis by Means of the Roentgen Ray of Diseases of the Osseous System, 283
- Diet, The Relation of, to Therapeutics, 633
- Differential Diagnosis by Means of the Roentgen Ray of Diseases of the Osseous System. William H. Dieffenbach, 283
- Diphtheria and Its Serum Treatment, 101
- Disruptive High Frequency Discharges, by the Reaction Method, as a New and Important Therapeutic Agent. M. W. Brinkmann, 603
- Drowning and Resuscitation, 213
- Early Treatment of Some Superficial Cancers, Especially Epitheliomas, by Pure Radium Bromide rather than Operation or X-Rays. Francis H. Williams, 581
- Eczema, 50
- Eight Hundred Dermatological Cases Treated with X-Ray and High Frequency Currents at the Mount Sinai Hospital, in New York, 98
- Electricity, A Rational Curative Factor. William S. Watson, 194
- in Errors of Refraction. Samuel J. Harris, 547
- Electro-Therapeutic and X-Ray Congress, 515
- Enlarged Prostate, The Treatment of, by the High Frequency Current. M. M. Johuson, 606
- Enuresis, Note on High Frequency Currents in, 92
- Epidemic Cerebrospinal Fever, Intraspinal Injections of Flexner and Jobling's Antimeningitis Serum in, 271
- Epithelial Growth of the Skin, Some of the More Usual Forms, J. A. Fordyce, 637
- Evolution of the Microscope—Therapeutic Action and Dan-
gers of the Roentgen and Becquerel Rays—Radium, Opsonic Method of Treatment of Dermatological Diseases. Henry Alfred Robbins, 518
- Exophthalmic Goiter and Myxedema. William Benham Snow, 517
- Experience with Opsonins and Bacterial Vaccines in Treatment of Tuberculosis and Non-Tuberculous Arthritis, 54
- Experimental Researches on Kromayer's Quartz Lamp. Prof H. Bordier and Prof. T. Nogier, 467
- Finkelpearl, H.—Treatment of Varicose Veins and Varicose Ulcers by the Static Wave-Current, 614
- Fulguration in the Treatment of Cancer. Dr. Keating Hart, 464
- Future of Electricity in Medicine, 91
- Gibson, J. D.—Report of One Hundred and Fifty Cases of Tuberculosis Pulmonalis, 173
- Gonococcic Arthritis Treated with Anti-Gonococcic Serum, 640
- Gonorrheal Arthritis, An Improved Treatment of (so-called Gonorrheal Rheumatism). Edward C. Titus, 475
- Graduated Labor in Pulmonary Tuberculosis: The Effect of Exercise on the Opsonic Index of Patients Suffering from Pulmonary Tuberculosis, 215
- Granger, Amédé—Roentgen Ray Diagnosis of the Disease of Bones and Joints, 561, 618
- Harris, Samuel J.—Electricity in Errors of Refraction, 547
- Heart, Diseases of, and Treatment: a Synopsis, 410
- High Candle-Power Lamp: Case from Practice. S. T. Birdsall, 558
- High-Frequency Currents, A Contribution to the Study of, 143
- Effluvation and Sparking in the Treatment of Malignant Tumors. J. A. Rivière, 124
- Metallic Discharge. A New Treatment; Its Possibilities, 91

- Heat and Cold in the Treatment of Joint Rheumatism, 379
- Humphris, F. Howard.—Indication for the Use of the Sphygmomanometer, 439
- What Is Pain? An Attempt to Define Its Origin and Nature, 63
- Hydrotherapy, The General Physiological and Therapeutic Action of. Curran Pope, 240
- The Role of, 102
- Indication for the Use of the Sphygmomanometer. F. Howard Humphris, 439
- Infectious Conditions, Therapeutics of, 89
- Treatment of, 488
- Influence of Copious Water-Drinking, 153
- of Light upon the Circulation, 46
- Is Radiography in Colors Possible? J. Rudis-Jicinsky, 456
- Is "Rheumatism" a Misnomer? 513
- Joint Diseases, The Treatment of, 205
- Johnson, M. M.—The Treatment of the Enlarged Prostate by the High Frequency Current, 606
- Kassabian, Mihran K.—Roentgen Dermatitis: Its Prevention and Treatment, 339
- Knee Brace, 658
- Leprosy, A New Method of Treating, by Training the Phagocytes to Cure the Disease Through Subcutaneous Inoculations of Pure Yeast Cultures and Dead Bacilli, 216
- Leucemia and Roentgen-Ray Treatment, 98
- Light Modalities in the Treatment of Disease. Thomas W. Brockbank, 297
- Light Modalities in the Treatment of Disease. Drs. Finkelpearl, Barrett, Massey, Pitcher, Bishop, Dickson, Schauffler, Nunn, Brinkmann, Dieffenbach, and Brockbank, 353
- Limitations of the Vis Medicatrix Naturæ, 407
- Lupus, Preliminary Note on the Treatment of, by Becquerel Rays, 638
- Massey, G. Betton.—Cancer and Its Treatment by Cataphoric Sterilization, 36, 83, 136, 197, 250, 317, 360, 446, 504, 566, 623
- McIntosh Aseptic Head Lamp, 657
- Mechanical Vibration as a Diagnostic Measure, 320
- in the Treatment of Constipation and Pelvic Conditions. Mary L. H. Arnold Snow, 471
- Mechano-Therapy of Autointoxication. Frederick H. Morse, 79
- Medical School for Indian Women, 387
- Metabolism, The Influence of Sea Air and Sea Baths on, 522
- Method of Exploring the Boundaries of Fistulous Tracts and Abscess Cavities, 374
- Morse, Frederick H.—Mechano-Therapy of Autointoxication, 79
- Morton, William J.—The Wave-Current and High Frequency Currents, 227
- Moser's Serum as a Therapeutic Agent in Scarlet Fever, 640
- Multiple Carcinomata Following Chronic X-Ray Dermatitis, 99
- Neurasthenia and Occupation Neuroses: Their Treatment with Electricity. Walter H. White, 307
- Nevus Flammeus, The Treatment of, 416
- New and Improved Apparatus, 62, 115, 170, 656
- New England Electro-Therapeutic Association, 332
- New Methods of Treating Diseases of the Genito-Urinary Tract, 261
- New Ozone Apparatus and Inhaler, 656
- Opposite Effects of Radiant Light and Heat and the Roentgen Ray, 536
- Patterson, Franklin.—Practical Experience with an Alternating Current Rectifier, 501
- Phototherapy, The Present Status of, 148
- Physiological Effects of Radiant Light and Heat, 479
- Physical Basis for Most Cases of Functional Disorder, 575

- Therapeutics, 55, 103, 154, 218, 273, 326, 385, 417
- Physiological Laws Relating to the Effects of Physical Measures as Employed in Therapeutics. William Benham Snow, 9, 130
- Practical Experience with an Alternating Current Rectifier. Franklin Patterson, 501
- Methods of Application of Radiant Light and Heat, 482
- Pitcher, Herbert F.—Advancement of the American Electro-Therapeutic Association, 493
- Pope, Curran.—The General Physiological and Therapeutic Action of Hydrotherapy, 240
- Presentation of a Case of Lupus, Showing the Effects of Treatment by Concentrated White Light. Felix Barrett, 393
- Pruritus Ani, Its Cause and Treatment, with Special Reference to the Use of the Roentgen Ray. R. D. Mason, 583
- Psychotherapeutic Methods, An Analysis of, 375
- Radiant Energy in Dermatology, 528
- in the Treatment of Simple Inflammation, 523
- Heat vs. Convective Heat, 634
- Radium Energy, Therapeutics of, 576
- for the Treatment of Cancer and Lupus, 92
- "The Specific Action of, as a Unique Force in Therapeutics," 208
- Recent Advances in the Roentgen Ray Treatment of Disease, 150
- Relation of Opsonic to X-Ray Therapy, 367
- Raynaud's Disease, Treatment of, with High Frequency Currents, 46
- Removal of Superfluous Hair by the X-Ray. F. A. Bardwell, 395
- Responsibility of the American Electro-Therapeutic Association, 461
- Rivière, J. A.—High Frequency Effluvia and Sparking in the Treatment of Malignant Tumors, 124
- Roentgen Dermatitis: Its Prevention and Treatment. Mihran K. Kassabian, 339
- Ray Diagnosis of the Diseases of Bones and Joints. Amédée Granger, 561, 618
- Ray in Epithelioma. William Allan Pusey, 469
- Report of One Hundred and Seven Cases of Cancer Treated with the, 210
- Technique in Dermatology, 51
- Treatment Far Below the Surface, 469
- Rudis-Jicinsky, J.—Is Radiography in Colors Possible? 456
- Sarcoma of the Eyelid with the Report of a Case in an Infant Seven Weeks Old, 100
- Sciatica, Physical Therapeutics in the Treatment of, 415
- Serum in Scarlet Fever, 478
- Treatment and the Prognosis Under Various Forms of Therapy of Cerebro-Spinal Fever, 639
- for Dysentery, 639
- of Epidemic Cerebro-Spinal Meningitis. Charles H. Dunn, 477
- Simple Inflammation, Treatment of, 486
- Skin, Errors in the Diagnosis and Treatment of Diseases of the, 52
- Snow, William Benham.—Physiological Laws Relating to the Effects of Physical Measures as Employed in Therapeutics, 9, 130
- Some Potent Therapeutic Influences, Present and Prospective, 324
- Spa Treatment of Circulatory Disorders, 270
- Specific Therapy against Tuberculosis, 54
- Sphygmomanometer in Diagnosis, 141
- Standardization of Physical Measures, 365
- Static Brush Discharge as a Means of Relieving Acute Induration and Promoting the Healing of Ulcers, 142
- Electricity in Inflammatory Conditions. Charles F. Spangler, 476
- Wave-Current, The Efficiency of, in the Treatment of Spasmodic Dysmenorrhea. Edward C. Titus, 117

- Sunshine Versus X-Rays in Tuberculosis of the Joints and Bones, 103
- Therapeutics, The Professional Mind with Reference to, 42
- Therapeutic Use of Water Drinking and Some of Its Dangers, 214
- Thyroid Extract in Epilepsy and Migraine Apropos of Ten Cases, 520
- Titus, Edward C.—The Efficiency of the Static Wave-Current in the Treatment of Spasmodic Dysmenorrhea, 117
- Tuberculin in Tuberculous Kidney, 215
Treatment of Tuberculosis in Children, 55
- Tuberculous Adenitis Treated by Radiotherapy, 100
Cystitis, Treatment of, with Special Reference to Roentgen Therapy, 258
Disease, the Treatment of, with the High Frequency Current, 45
- Tuberculosis of the Skin, 50
of the Upper Air Passages. Dr. Gleitsmann, 470
Pulmonalis, Report of One Hundred and Fifty Cases of. J. D. Gibson, 173
- Use of X-Ray from the Point of View of the General Practitioner, 99
- Varicose Veins and Varicose Ulcers, Treatment of, by the Static Wave-Current. H. Finkelpearl, 614
- Various Conditions, The Treatment of, with Static Electricity and High Potential Currents. T. Harris Cannon, 398
"Verdee" Vibrator, 438
- Vibration. Frank A. Davis, 29
- Watson, William S.—Electricity, A Rational Curative Factor, 194
- Wave-Currents, 382
The, and High Frequency Currents. William J. Morton, 227
- What is Pain? An Attempt to Define Its Origin and Nature. F. Howard Humphris, 63
"Will Radium Cure Cancer?" 208
- White, Walter H.—Neurasthenia and Occupation Neuroses: Their Treatment with Electricity, 307
- Wright, S. J.—Advanced Therapeutics of Arthritis Deformans—Progressive Polyarticular, 559
- X-Ray and Exophthalmic Goiter, G. E. Pfahler, 637
in the Treatment of Cancer and Skin Diseases, 152
in the Treatment of Carcinoma. S. E. Hunter, 638
Treatment of the Tuberculous Kidney by Means of the, 151







NB 84

